REVISION OF ICOSTA (=LYNCHIA AUCTT.) WITH
ERECTION OF A RELATED GENUS PHTHONA
(Diptera: Hippoboscidae)

By T. C. Maa

Abstract: Icosta Speiser 1905 is restored to replace the mis-used generic name “Lynchia Weyenbergh 1881.” The genus, as here dealt with, is composed of 56 species and subspecies (plus 6 unnamed ones) which are allotted to 5 subgenera, i.e. Ornithoponus Aldr., Icosta s. s., Ardmoeoa, Gyopoeoa and Rhyponotum n. subgen. Being cosmopolitan and largely tropical, the genus has had its distributional center probably in the Ethiopian Region in the past, and in the Oriental Region at the present. The host relationships have apparently been influenced during the process of evolution much more strongly by ecological similarities than by phylogenetic affinities of host-birds. They are, therefore, evidently correlated with structural and bionomic speciation of both the parasites and hosts in question. In addition to descriptions, records and syncopic keys, the paper also provides summaries and analyses of data of distribution, hosts, phoresy and hyperparasitism. Among previously known forms, ardeae Mcq. (with ssp. botariorum Swk.) is resurrected as a species independent of albipennis Say; rufiventris Bigot, restored to replace volcotti Swk.; tuberculata Ferr., degraded as a subspecies of acromalis Speis.; barbata Theod. & Oldr. and interrupta Maa, both sunk as synonyms of meda Maa; penelopes Weyenb., rottensis Statz and nipponica Kishida, removed to Stilbometopa Coq., Ornithomya Latr. and Crataerina Olf., respectively; whereas nigrita Speis., modesta Maa and leptoptera Maa, removed to Phthona, n. gen. New species and subspecies here described are bucerotina (Thailand, Borneo), corvina (Ceylon, India, Burma, Thailand), diluta (New Guinea), elbeli (Burma, Thailand, Malaya, Borneo, Philippines), feniestella (Burma, Thailand, Taiwan, Java, Borneo, Philippines), holoptera omnisetosa (China, Malaya, Philippines, New Guinea), humilis (Liberia), jactatrix (New Guinea), lonchorhina (Thailand, Taiwan, Malaya, Philippines), papulata (Komodo I. nr Java), paramonovi (Australia), sensilis (E. Pakistan, Burma, Thailand, Malaya, Philippines), sensilis reducta (India), spinosa (Thailand, Laos), subdentata (Uganda), tarsata (Thailand), wenzeli (Philippines). Appended to the paper are a review of Phthona n. gen., host index of Icosta and Phthona, reproduction of Weyenbergh’s description of Lynchia with translation and annotations, a selected and chronologically arranged bibliography, as well as descriptions of I. macclurei (Thailand) I. malagasci (Madagascar), and I. antica (New Guinea), n. spp.

Icosta Speiser, generally known as “Lynchia Weyenbergh” since 1926, is the largest hippoboscid genus and includes about a third of the species of the entire family. Altogether 65 nominal species (1 doubtful and 3 partially synonymous) have been described by 20 authors—9 species by Maa; 8 each by Ferris and Speiser; 6 by Macquart; 5 each by Bequaert and Walker; 4 by Rondani; 3 each by Lutz, Swenk and van der Wulp; 2 by

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2. B. P. Bishop Museum, Honolulu, Hawaii 96819, USA.
Bigot; 1 each by Austen, Dugés, Falcoz, Leach, Packard, Paramonov, Percheron, Say, and Theodor et al. World checklists of the genus have been provided by Speiser 1908c, Maa 1963; synoptic keys to “larger” species and to subgeneric groups of the world, by Bequaert 1933b, 1945b and Maa 1963, respectively; key to species of the Americas by Bequaert 1955, that of Palaeartic Region, by Theodor et al. 1964, and that of Africa, by Maa 1964. The nomenclature of the genus has been discussed at length by Bequaert 1926b, 1955 and Maa 1963; and host records of different species have been summarized by Bequaert 1953a and Maa 1963. (For details of historical trends of the genus, see Bibliography). No world revision has ever been published and this report is an attempt to fill that gap. Besides descriptions, redescriptions and synoptic keys, the system of subgeneric groupings is revised, status of certain published names adjusted, a few neo- and lectotypes are selected, distributional patterns, host relationships and evolutionary trends discussed, and occurrences of phoresy and hyperparasitism reviewed. For various reasons, 6 of the species, though included in the keys, are left unnamed.

Terminology

The descriptive terms here used are modified from Bequaert (1953a) and are indicated in fig. 7, 11, 13-14, 21-23, 28-29, 31-32, 140, 142-43, 175, 178. All relative measurements for each species were made under the same magnification. The width of face refers to the smallest width of interocular face; of eye, to the greatest width of an eye in front view of head; of post-vertex and scutellum, respectively, to the interdistance of bases of vertical and of scutellar bristles; of mesonotum, to the interdistance of outermost points of lateral notopleural margins. Lengths of head and thorax were measured along a hypothetical median line; that of palpus includes only its sclerotized pigmented area. The relative lengths of tarsomeres of hindlegs are measured in their dorsal view. The relative length vs width of a certain structure is expressed by the symbol “x” between 2 numerals, for instance, mesonotum 26 x 35 means it is 26 micrometric units long, 35 units wide. As understood here, the orbital bristles refer only to the macrosetae (usually 2 in number) on each inner orbit, whereas the minor, ordinary setae thereon are termed orbital setae; the occipital margin, only to the section behind postvertex. The “inner” and “outer” margins of legs are so termed as if the leg 1 is stretched cephalad and legs 2 and 3 stretched caudad. The tarsal spine formula refers to the average number of spines under segments 1-4 of fore, mid and hind tarsi, respectively. Thus, the formula 1.0.0.0/2.1.1.0/2.2.1.1 means 1 spine under segment 1 of fore tarsus, no spines under segments 2-4 of same tarsus, 2 spines under segment 1 of mid tarsus, and so on. The laterite 2 refers to the ventral submembranous area under syngyrtes 1-2 at each side; laterite 3, to the lateral piece emboying abdominal spiracle 3; laterite 7, to the knob-like piece near ♀ abdominal spiracle 7. The different kinds of hairs are arbitrarily classified into 4 categories: spines, for short, very stout, dark colored modified hairs; bristles or macrosetae, for long, stout, erect or suberect hairs; setulae, for extra-fine, very short hairs; setae, for ordinary non-modified hairs. The male genitalia are described as if in normal resting position, the apical decurving (as seen in the figures) of an aedeagus or paramere refers to its curving ventrad (of the insect).

Material

The paper is largely based on specimens in Bishop Museum (BISHOP). Those examined in, or borrowed from other institutes are indicated by abbreviations in parentheses,
These are:

AMNH—American Museum of Natural History at New York City,
AMS—Zoölogisch Museum der Universiteit van Amsterdam,
ANIC—Australian National Insect Collection, CSIRO, at Canberra,
BMNH—British Museum (Natural History) at London,
BRX—Institut Royal des Sciences Naturelles de Belgique at Bruxelles,
CAS—California Academy of Sciences at San Francisco,
CZHNM—Chicago Natural History Museum (recently renamed Field Nat. Hist. Mus.),
GNV—Museo Civico di Storia Naturale at Genova,
HUJ—Hebrew University Department of Parasitology at Jerusalem,
KIBI—Zoologisk Museum at Kobenhavn,
LDN—Rijksmuseum van Natuurlijke Historie at Leiden,
LND—Zoological Institute at Lund,
MAC—Musée Royal de l’Afrique Centrale at Tervuren,
MCZ—Museum of Comparative Zoology at Harvard,
MLN—Museo Civico di Storia Naturale at Milano (M. Bezzi Colln.),
SAIMR—South African Institute for Medical Research at Johannesburg,
STK—Naturhistoriska Riksmuseum at Stockholm,
UCB—University of California Department of Entomology at Berkeley,
USNM—United States National Museum at Washington, D.C.,
VRC—Virus Research Centre at Poona,
ZMB—Institut für Spezielle Zoologie und Zoologisches Museum at Berlin.

The subheading "Material" under each species and subspecies does not include types and other previously reported specimens. For brevity, early authors' types, when existing and re-examined by me, are not so indicated; second code symbols, Bo, NG, Pl and SI (for Borneo, New Guinea, Philippines and Solomon Is., respectively) of BBM field numbers are omitted; also omitted are authors' names of birds and initials of collectors' names.

**Bibliographies**

Bequaert (1953, 1955, 1957) has already published excellent bibliographies for the family as a whole and for various American species (plus dukel and ardeae). For this reason and due to much nomenclatorial confusion in the past, the bibliographies given in this paper are admittedly quite incomplete. The one appended to the paper was so selected, annotated and arranged that it represents a sketch of historical trends in the studies of the genus; whereas those under various species and subspecies include merely articles containing original descriptions, and more recent revisions and illustrations. The term "Type" following the citation of an original description refers to the holo- or lectotype only.

**Illustrations**

All accompanying figures, unless otherwise indicated, were drawn with the aid of a camera lucida. Most of them were from microscopic slides and in such cases, the slide number is given at the side of each figure. The tarsi were mounted after being slightly treated with KOH, hence a little disfiguration of their shape must be allowed. The palpi were mounted without KOH treatment.
Names of Hosts

The generic and specific names of host birds used in this paper have been checked with J. L. Peters' (1931 to date) Check-list of birds of the world. The nomenclature and sequence of the families are those of E. Mayr & D. Amadon (1951, Amer. Mus. Novitates 1496: 1–42). To facilitate tracing of original collection data, all field numbers, whenever associated with specimens, are listed.

Acknowledgments: I am deeply indebted to the authorities of the above mentioned institutions for the privilege of studying and reporting on the materials under their charge. Without their aid, generosity and cooperation, this paper could, by no means, have attained completion. I am particularly grateful to Dr Alan Stone for his kindness in examining the Swenk types for me, to Dr D. Colless for sending types of Dr Paramonov's manuscript new species, to Dr R. E. Elbel for much information about his Thailand collection, to Dr H. E. McClure of MAPS (U.S. Army Migratory Animals Pathological Survey), and to many other correspondents for generously providing me additional materials. The drawings were patiently prepared by B. Y. Hu, S. M. Kwang, C. T. Lin and M. F. Tan.

GENERIC NOMENCLATURE

The name of the genus here called *Icosta* has caused much bewildering confusion. Of the published nominal species included therein, none was originally used in combination with *Icosta*. Instead, 31 species were originally assigned to *Olfersia* Wdm. (strictly speaking, not *Olfersia* Lch.), 21 to *Lynchia*, 7 to *Ornithomyia*, 2 to *Ornithophila*, and 1 each to *Hippobosca, Feronia, Stilbometopa and Ornithoponus*. On the other hand, 1 species each, originally assigned to *Ornithoponus* and to *Lynchia*, i.e., *rottensis* Statz and the recent species *nipponica* Kishida, do not belong here but to *Ornithomya* and *Crataerina*, respectively. An abridged synonymy of the genus follows.

*Icosta* Speis. 1905a : 358 (type, *dioxyrhnha* Speis.)


*Hippobosca* : Packard 1869.—Not Linn. 1758 (type, *equina* Linn.)

*Ornithomyia* : Perch. 1838, Wk. 1849–61, Bigot 1885, Duges 1887.—Not *Ornithomya* Latr. 1802 (type, *avicularia* Linn.)

*Feronia* : Lch. 1817–18.—Not Lch. 1817 (type, *spinifera* Lch.)

*Olfersia* : Say 1823.—Not *Olfersia* Lch. 1818 (type, *spinifera* Lch.)


*Stilbometopa* : Speis. 1904.—*Not Coq. 1899* (type, *fulvifrons* Wk.)

As shown in above list and fig. 1, neither of the only available names—*Icosta* and *Ornithoponus*—was found in favor by most workers, whereas the name *Lynchia* (unavailable but common in use for the genus since 1926) has been employed by different authors on
different occasions in 6 different meanings. It was 40 years ago when most workers used Olfersia for Icosta, Pseudolfersia for true Olfersia, and Lynchia for Pseudolynchia. Then in the very first of his numerous articles on Hippoboscidae, Bequaert (1926b) re-interpreted Weyenbergh's description and concluded that Lynchia should be the correct name for what is here called Icosta. His interpretation and conclusion were accepted and unchallenged until the appearance of my (1963) paper in which true Lynchia was suggested to be synonymous with Stilbometopa, and 11 characters of Icosta were considered not quite in accord with (if not strongly contradictory to) Weyenbergh's description. Comments so far received from all but one dipterist, were in favor of my suggestion. While I was preparing this report, fresh attacks on this nomenclatorial problem made me more convinced that the name Icosta has to be restored for replacing "Lynchia." Of course, such a nomenclatorial change will be painful for a while but I hope it might not be more painful than the change from "Olfersia" to Lynchia advocated 40 years ago.

Bequaert (1926b, 1955) concluded that Weyenbergh's genus is (a) lacking all 3 ocelli,
(b) having a short postvertex and a long mediovertex, and (c) having 2 closed basal cells but no closed anal cell, i.e., having 2, not 3, crossveins. The points (a) and (b) fit both Icosta and Stilbometopa thus leaving only the key point (c) for which strong emphasis in my long discussion (i.e., p. 106–110, fig. 3, table 3) was made on Weyenbergh’s wording, “La nervadura anal nace con raíz doble, se dirige, con fuerte curvatura, al borde posterior del ala.” To clarify further the situation and to justify the change suggested here, Weyenbergh’s original text and Bequaert’s translation, supplemented with explanatory figures, are given in Appendix II. As pointed to by its derivation, Icosta (Greek εἰκόστα, the 20th) was so named because it was then the 20th genus ever proposed in Hippoboscidae.

INTERGENERIC AFFINITIES

Under the name “Lynchta”, Icosta was recently re-defined by Bequaert (1955: 261–64) and Theodor et al. (1964: 46). More important features are: Body strongly flattened. Frons produced into 2 anterior diverging processes which reach or exceed level of antennal apices; interantennal area well exposed. Antenna normal (for the family), short. Vibrissal process often present. Postvertex bare, much smaller than, and well definable from, mediovertex, posterolaterally touching, or nearly touching, inner orbits; ocelli (except in Simplex group) entirely wanting, represented by single discal pit or short median focus on postvertex; occipital margin (in front view of head) straight or at most, weakly convex or concave. Pronotum not, or hardly, visible in dorsal view of insect. Humeral callus horn-like. Scutellum always with pair of preapical bristles which are well apart from each other; setae on lateral sections of posterior margin each at most with very minute basal finger-like tubercle. Prosternum (termed by Bequaert as prothoracic presternum) almost always well developed, setose. Metapleurotergal callus simple, weakly swollen, with strong spines and ordinary setae. Metasternal process rarely present. Wing non-caducous; R and M branches crowded toward C; 2 crossveins (mcu absent); im much closer to base than to apex of cell 2be; Cu+1A atrophied, leaving very short basal stub; 2A strong; axillary lobe lanceolate; membrane not wrinkled, but extensively setulose; anal margin not ciliate; alar sensory pores situated near apex of vein R+5 and at junction of Mi+2 and rm; alula oblong, densely ciliate, its hind margin often thickened like a vein. Tibiae and tarsi all with sensillae; tibia 3 in addition with sensory pores. Tarsal claws actually bifid but seemingly trifid; empodia feather-like; pulvilli of same legs virtually symmetrical. Abdominal dorsum medially with broad transversely striolate area; tergite 3 (and very rarely 5, too) represented by small transverse plate which is in some species absent in ♂ or in both sexes; tergite 4 never definable; 6 large, very rarely interrupted at middle; laterites 3, 4 and 5 rarely definable; ♂ laterite 7 usually present though never large; sternite 1 weakly sclerotized, finely setose; ♀ supra-anal plate wanting; ♀ pregenital plate, when occasionally present, undivided and very small; ♂ genitalia normal. Puparium bare, its posterior “cap” clearly divided into 6 sectors, each sector bearing 10–30 pneustic pores arranged in U-shape along outer (anterior) and sectorial margins. Gynandromorphism unknown; sexual dimorphism often well exhibited in midleg and in abdominal chaetotaxy and sclerotization. Parasitic on birds.

While several species of Icosta can be immediately singled out from all other hippoboscids by certain unique characters they possess, no one such character is universal for
the genus, therefore, leaving the genus only to be recognized from a combination of mi-
nor characters — postvertex shorter than, and well defined from, mediovertex; scutellum
with pair of strong bristles and with no, or hardly any, developed setigerous tubercles
on hind margin; metapleurotergal callus simple and weakly swollen; wing with 2 cross-
veins, im distinctly closer to base than to apex of cell 2bc.

In Speiser's (1908c: 445) classificatory scheme, the genus was placed along with Ortho-
lersia, Pseudolynchia and Olfersia in the subfamily Olfersiinae; in Bequaert's (1953: 16),
placed with Pseudolynchia and Microlynchia in Ornithomyiinae, Ornithomyini; and in Maa's
(1963: 90), placed in Ornithomyiinae next to Pseudolynchia. In fact, should the presence
or absence of the very short and partly colorless vein im be neglected, there is no clear-cut
dividing line between Icosta and Pseudolynchia. The finger-like setigerous tubercles on
hind scutellar margin and the long numerous laterocentral bristles on prescutum, were
long reputed as diagnostic characters of Pseudolynchia. But following the discovery of Ps.
serratipes Maa in New Guinea, they prove to be hardly more than of specific importance.
On the other hand, certain characters possessed by Pilosa, Meda and Nigrita groups are
evidently much more significant than the mere presence or absence of the vein im, and
therefore, Pseudolynchia might well be rated as a subgenus of Icosta. To conserve the
currently used system, the status of Pseudolynchia is here unchanged, while the Nigrita group
is raised to generic rank (as Phthona), and Pilosa and Meda groups, to subgeneric rank.

Besides Pseudolynchia and Phthona, the closest relative of Icosta is Microlynchia which is
mainly characterized by the strongly swollen metapleurotergal callus. Still further apart,
there stands Olfersia where several unique characters — confluency of medio- and postver-
tices, absence of scutellar bristles and strongly curved protuberance of metapleurotergal
callus — are unknown to related genera. More detailed comparison of the 5 genera are
given in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>Icosta</th>
<th>Phthona</th>
<th>Pseudolynchia</th>
<th>Microlychnia</th>
<th>Olfersia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facial and mesonotal pilosity dense</td>
<td>±</td>
<td>—</td>
<td>+</td>
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<td>—</td>
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<tr>
<td>Frontal process broadly rounded at apex</td>
<td>±</td>
<td>—</td>
<td>+</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Vibrissal process prominent</td>
<td>±</td>
<td>—</td>
<td>+</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Ocelli well developed</td>
<td>±</td>
<td>—</td>
<td>—</td>
<td>±</td>
<td>—</td>
</tr>
<tr>
<td>Anterior thoracic spiracle enlarged</td>
<td>±</td>
<td>+</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Scutellum furrowed medially</td>
<td>±</td>
<td>+</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Scutellum subtruncate posteriorly</td>
<td>±</td>
<td>+</td>
<td>—</td>
<td>±</td>
<td>—</td>
</tr>
<tr>
<td>Scutellar bristle present</td>
<td>+</td>
<td>—</td>
<td>+</td>
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<td>—</td>
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<tr>
<td>Finger-like setigerous tubercles of scutellum present</td>
<td>±</td>
<td>—</td>
<td>+</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Metapleurotergal callus normal</td>
<td>+</td>
<td>+</td>
<td>—</td>
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<td>—</td>
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<tr>
<td>Prosternum well developed</td>
<td>±</td>
<td>+</td>
<td>+</td>
<td>—</td>
<td>—</td>
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<tr>
<td>Metasternal process present</td>
<td>±</td>
<td>+</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Vein im present</td>
<td>±</td>
<td>+</td>
<td>+</td>
<td>±</td>
<td>—</td>
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<tr>
<td>Tergite 3 present</td>
<td>±</td>
<td>+</td>
<td>+</td>
<td>±</td>
<td>—</td>
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<tr>
<td>Tergite 5 present</td>
<td>±</td>
<td>+</td>
<td>±</td>
<td>—</td>
<td>±</td>
</tr>
<tr>
<td>Laterite 3 present</td>
<td>±</td>
<td>+</td>
<td>±</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>♀ Laterite 7 present</td>
<td>±</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>♀ Pregenital plate present</td>
<td>±</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Surface of puparium bare</td>
<td>+</td>
<td>+</td>
<td>—</td>
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</tbody>
</table>
INFRAGENERIC GROUPING

The first attempt to subdivide the genus was made by Bequaert (1933b) who stated, “on size alone, most of the species may be divided rather readily into 2 groups.” In his “larger species” group, pilosa, palustris, americana, fusca, nigra, dukei, penelopes and raptatorum were included (the “smaller species” were not enumerated). The same group was revised (1945b) with the replacement of “palustris” by schoutedeni and the additions of majuseula, wolcottii, massonnati, villadae, macquartii, rufiventris and pallidilabris. As admitted by Bequaert (1933b: 68), this arrangement did not regard true relationship and hence, was merely for convenience. The scheme suggested by Maa (1963), covering 33 species (2 of them unplaced), was comprised of 11 species-groups represented, respectively, by americana, hirsuta, holoptera, pilosa, massonnati, simplex, plana, dioxyrhina, longipalpis, meda and nigrita. More species are now known. And, by weighing the different characters and correlating them with distributional ranges and host relationships, a revised scheme.
Fig. 3. *Icosta* species (*diluta* to *longipalpis*, arranged alphabetically), left palpi, lateral view, magnifications varied.

is here proposed. The *nigrita* group is assigned to the new genus *Plithona* while the remaining ones re-allotted into 5 subgenera and a number of groups and subgroups. The entire hierarchy follows (see Addendum).

**Subgenus Ornithoponus** Aldr.
- **Group Americana.** 7 species in 3 subgroups: (a) *americana*, *rufiventris*, *angustifrons*, *lattifacies*; (b) *dukei*, *nigra*; (c) *suvaensis*.
- **Group Hirsuta.** 2 species in 2 subgroups: (a) *hirsuta*; (b) *tripelta*.
- **Group Simplex.** 5 species in 2 subgroups: (a) *plauanni*, *zumpti*; (b) *maquilingensis*, *simplex*, *australica*.
- **Group Minor.** 5 species and subspecies: *minor*, *sensilis sensilis*, *s. reducta*, *lonchurae*, sp. "W".
- **Group Parallelifrons.** 3 species: *parallelifrons*, *paramonovi*, *papulata*.

**Subgenus Icosta** Speis., s.s.
- **Group Plana.** 11 species in 3 subgroups: (a) *wenzeli*; (b) *recessa*, *jaclatrix*, *elbeli*; (c) *tarsata*, *plana*, *itra*, *fenestella*, *diluta*, *samoana*, *chalcolampra*. 
Group Longipalpis. 12 species and subspecies in 4 subgroups: (a) *humilis*, subdentata; (b) *coalescens*; (c) *mecorrhina*, *longipalpis*, *acromialis* *acromialis*, *a. tuberculata*; (d) *corvina*, *bicorna*, *spinosa*, *bucerothina*, *dioxyrhina*.

Subgenus *Ardmoeca* n. subg.

Subgenus *Gypoeca* n. subg. 1 species: *meda*.
Subgenus *Rhyponotum* n. subg. 1 species: *pilosa*.

KEY TO GENERA AND SUBGENERA OF ICOSTA-COMPLEX

1. Face as usual, postvertex much smaller and shorter than, and well defined from, mediovertex, lunula partly, or completely, separated from frons proper by transverse
Fig. 5. *Icosta* species (schoutedeni to zumpti, arranged alphabetically) and *Phthona* species, left palpi, lateral view, magnifications varied.

- Suture; scutellum with 2 (1+1) bristles; metapleurotergal callus weakly or moderately swollen, at most conical, never forming L-shaped strong protuberance; puparium with smooth surface

Face quite unusual in appearance, mediovertex confluent with postvertex, or when very weakly definable then much smaller and shorter than postvertex; lunula and frons proper entirely confluent; scutellum lacking bristles, but ordinary soft setae; metapleurotergal callus very strongly produced into L-shaped protuberance; puparium uniformly spiny.

**Genus Olfersia**

2 (1). Wing with only 1 crossvein (*rm*), hence only 1 closed basal cell (*lbc*); ♀ always with tergite 3, no tergite 5; ♂ either with tergite 5 and no tergite 3, or with both tergites 3 and 5.

- Wing with 2 crossveins (*rm* and *lm*), hence 2 closed basal cells (*lbc* and *2bc*); tergites 3 and 5 not as above, either both sexes with tergite 3 only, or with (or without) both 3 and 5, very occasionally (in 1 species only) ♀ with tergite 3 and no tergite 5 while ♂ without either 3 or 5.

3 (2). Hind scutellar margin truncate or subtruncate, sharply edged, with a medially broadly interrupted transverse series of tiny finger-like tubercles each bearing a fine short...
seta; metapleurotergal callus weakly swollen, not conical; metasternal process well developed; prescutum with numerous lateroventral bristles which reach or surpass transverse mesonotal suture; frontal process in profile broadly rounded, vibrissal area acutely projecting forward ........................................ Genus Pseudolynchia

Hind scutellar margin distinctly convex, roundly edged, without above-described tubercles; metapleurotergal callus moderately swollen, conical; metasternal process absent; prescutum with only lateroventral setae which are far from reaching transverse mesonotal suture; frontal process tooth-like, acutely projecting forward; vibrissal area broadly rounded........................................ Genus Microlynchia

4 (2). Eye excessively small, only ca 1/3 as wide as face and leaving postorbit about as long as average width of inner orbit; scutellum ca 1.2 as long as scutum, posteriorly subtruncate; pro- and mesosterna both lying on horizontal plane and of similar degree of pigmentation and sclerotization, mesosternum anteriorly truncate, not bilobed; tibia 3 (fig. 12, leptoptera) with only sensory pores, no sensillae... Genus Phthona

Eyes normal in size, more than 1/2 as wide as face and leaving postorbit much short-
Fig. 7. *Icosta* species (arranged alphabetically), anterior part of thoraces, ventral view showing prosterna and mesosternal lobes, same magnification. Drawn from specimens in alcohol.

er than average width of inner orbit; scutellum not so short, its posterior margin more or less convexly curved; prosternum not as above described, more or less pale and less sclerotized than mesosternum and lying on oblique or vertical plane, mesosternum usually bilobed anteriorly; tibia 3 (fig. 11–12, except *leptoptyra*) with both sensory pores and sensillae. Genus *Icosta* ........................................................................................................ 5

5 (4). Mesonotum largely bare, never uniformly pilose; inner orbit entirely, or at least with
Fig. 8. *Icosta* species (*acromialis* to *fenestella*, arranged alphabetically), fore femora, anterior view, magnifications varied.

outer 2/5 shining; palpus in lateral view at least 1.5× as long as wide; ♀ abdomen never with very robust blunt spines, ♀ laterite 7 never nipple-like......................... 6

Mesonotum (fig. 163) uniformly covered with dense recumbent setae; inner orbit (fig. 166) entirely, or nearly entirely, leathery, not shining; palpus (fig. 4, *pilosa*) in profile hardly longer than wide; ♀ abdomen (fig. 162) with 10-20 exceedingly robust blunt spines at each side near spiracles 4-5, ♀ laterite 7 (fig. 161) exceedingly strongly protuberant .............................................. Subgenus *Rhyponotum*

6 (5). Anterior thoracic spiracle lateral or dorsolateral, often linear, with shorter axis only a fraction as long as longer axis; interdistance of bases of scutellar bristles more than 2× median length of scutellum; ♀ femur 2 lacking spines on inner (posterior) margin ................................................................. 7

Anterior thoracic spiracle dorsal, exceedingly large, with shorter axis ca 1/2 as long as longer axis; interdistance of bases of scutellar bristles subequal to median length
Fig. 9. Icosta species (humilis to wenzeli, arranged alphabetically), fore femora, anterior view, magnification varied.

of scutellum; ♂ femur 2 with patch of spines on inner margin near base ..................

Subgenus Gypoeca

7 (6). Venter of all femora bare besides few marginal setae; all tibiae very sparsely setose; palpus in profile more than 2X as long as wide, when not so long (in Parallelifrons group only) then wing exceedingly thin, colorless (anterior veins very pale yellowish) and cells 1m and 2m+1a extensively bare; ocelli absent, occasionally (in Simplex group only) present or each represented by small pit .................. 8

Venter of femur 3 (fig. 147-148) densely uniformly setose except an oval bare area at base, venter of femur 2 sparsely setose, that of femur 1 marginally setose; venter of tibiae 1 and 3 densely uniformly setose; palpus (fig. 2, albipennis, ardeae) 1.5-2.0 X as long as wide; wing (fig. 119-122) normal in texture, fuscous, anterior veins blackish, surface entirely setulose, at most bare at posterior 3/4 of cell 2a; ocelli always absent, represented by single median fovea on postvertex ... Subgenus Ardmoeca

8 (7). Vibrissal area (fig. 6, americana, etc.) anteroventrally rounded-off (seldom angular or
Fig. 10. *Icosta* species (arranged alphabetically), right fore tarsi, ventral view, ordinary setae omitted, magnifications varied.

Subangular), never tooth-like, never separated from frontal process by deep incision; frontal process apically rounded (occasionally—in Simplex group—submembranous and tooth-like), and in dorsal view, never exceedingly broad at basal 2/3 and then suddenly narrowed apicad; metabasisternum never produced into posterolateral processes; posterior scutellar margin fairly strongly convex; tarsus 1 never apically


Fig. 11. *Icosta* species (*acromialis* to *hirsuta*, arranged alphabetically), right hind tibiae, posterior view, showing distribution of sensillae and sensory pores, ordinary setae omitted, magnifications varied. For “sensilla”, read “sensillae.”

asymmetrical....................................................................................................................... Subgenus *Ornithoponus*

Vibrissal area (fig. 6, *bicorna*, etc.) anteroventrally produced tooth-like and sharply separated by deep incision or notch from frontal process which is also tooth-like and not submembranous; when vibrissal area and frontal process occasionally not so, then frontal process (in *recessa*, E. Africa and as in fig. 62, *elbeli*) in dorsal view exceedingly broad at basal 2/3 and suddenly narrowed at apical 1/3 and leaving frontal notch broadly U-shaped (and median section of hind scutellar margin almost straight), or metasternal process (in *humilis*, W. Africa, *subdentata*, E. Africa) strong-
Evolutionary trends within the genus have scarcely been investigated, and the only published treatise on this subject appears to be by Maa (1963: 111–12) in which 2 points were discussed. Firstly, the Americana, Hirsuta and Holoptera groups on one hand, and the Nigrita and Meda groups on another, represent the 2 extremes of evolution; the Pilosa and Massonnati groups are rather isolated; and the Plana, Dioxyrhina and Longipalpis groups together form a “Formenkreis.” Secondly, the various species-groups...
have diversified in 14 directions, viz., sexual dimorphism, facial and thoracic pilosity, frontal, vibrissal and mesosternal processes, visual organs, mesothoracic spiracle, median furrow and posterior truncation of scutellum, scutellar bristle, size and shape of wing, crowding of R and M branches toward C, and abdominal sclerotization. These points more or less conform with what are discussed in this paper, and some of them are comparable to those in related genera.

As the diversifications among the various species and species-groups are not always lined in a continuous series and some of the connecting links have probably been lost in the past, it is difficult to draw a clear and convincing picture of the evolution. At first, the genus was assumed to have evolved along 2 main branching-outs, one with frontal and vibrissal processes both broadly rounded at apices and confluent to each other at bases, and another with such processes both acute at apices and sharply separated from each other at bases. The existence of isolated groups and the discovery of intermediate forms deny such an assumption. Analyses of host relationships, with special reference to host-parasite evolutionary parallelism, also failed to shed any light upon this problem. Although phylogenetically closely-related flies are often parasitic on closely-related birds and vice versa, this phenomenon is, as a rule, true only for lower taxonomic categories (species, genera) but not higher ones (families, orders) of birds, and for mono- and oligoxenous but not pleio- and polyxenous flies. Furthermore, same families and orders of birds may harbor flies having different host ranges and different systematic affinities. For instance, the Accipitridae (see Appendix 1) probably serve as breeding and occasional hosts of not less than 11 and 4 Icosta species, respectively, and among the 11 breeding parasites, 5 each are oligo- and polyxenous, 1 is pleioxenous, and they belong to 5 different species-groups (Americana, Simplex, Plana, Longipalpis, Meda). The “time” or palaeontological factor is also of little help since there is no fossil record for the genus. What can be only speculated are (1) the Americana group, though apparently more generalized than others, probably established itself in the Americas and became flourishing there in a comparatively recent date; (2) the Plana and Longipalpis groups, now flourishing in the Oriental Region, probably established there in a slightly later date; and (3) the Ethiopian Region has apparently been the cradle of the entire genus. Point (1) is evidenced by the Neotropical fauna, as a whole, being geologically young and all species of the genus occurring there being quite closely related, obviously a result of rather recent branching-outs. Points (2) and (3) are supported by the facts that the degree of diversification among the Oriental species of Plana and Longipalpis groups is less significant than that among their Ethiopian counterparts, and at the same time, more significant than that in all American Icosta species. Points (2) and (3) are supported further in that the Ethiopian Region is the present-day home of all subgenera and speciesgroups of Icosta with the possible exception of the Parallelifrons group. When the hostbirds are classified from both ecological and morphological evidences, it can be seen immediately that ecological factors, especially nidificating sites of birds, have played a very important role in the evolution within the genus Icosta (see chapter on Host Relationships).

The characters listed in Table 2 are so described as to indicate their presumably generalized conditions in the genus. For instance, the presence of ocelli is presumed to be a generalized character while the reverse, the absence of ocelli, is presumed to be a specialized character. Some of those characters, such as the uni- or multiserial orbital setae, though being highly useful for specific recognition, obviously bear little or no phylo-
genetic significance. Some others such as the relative conspicuousness of mesopleural concavity and length of mesotsernal lobes are admittedly and necessarily arbitrary. Still others, such as the dorsoventral compressing of body, degree of sexual dimorphism and of host specificity, are linked to other sorts of speciation and are of high significance. The flattening of body is a general tendency of speciation in many groups of ectoparasites, and within the Hippoboscidae, is most pronounced in Lipopteninae (Lipoptena, Neolipoptena, Melophagus). It is linked with the enlarging and switching-dorsad of mesothoracic spiracle, the shortening of scutellum, the weakening of mesopleural concavity for receiving femur 1 in repose, the strengthening of lateral abdominal setae, the lesser declivity of prosternum and several other characters. The sexual dimorphism is chiefly associated with the degree of ♀ abdominal sclerotization which is in turn an adaptation of the ovoviviparous life of many ectoparasitic flies. The degree of host specificity, particularly in Icosta, on the other hand, is correlated with the habits of host-birds.

Regarding the subspecific diversifications, it may be said that geographical isolation has not been effective for flies parasitic on a great variety of birds (polyxenous flies) or on long-distance migratory birds. Of the 62 species, sensilis, acromialis, ardeae and holoptera are divided into 2 subspecies each. A preliminary analysis of several pleio- and polyxenous species upsets the attempt to discriminate physiological subspecies.

The theory of evolutionary reduction—that is, generalized forms have more segments, etc., than do the specialized forms—does not work very well in Icosta. For instance, even in the quite closely related species duket and nigra, the tergite 3 is present in the former and absent in the latter; the presence of tergite 5 is found in the Hirsuta group which is by no means very generalized in other respects. On the other hand, there may be simultaneous positive and negative branching-outs. The basic type of the extent of wing-setulae, as exemplified by the Americana group, tends to evolve towards 2 opposite directions, one tending to cover the entire wing surface as in the Holoptera subgroup and another, decreasing in extent and leaving cells 1m and 2m+1a with extensive bare area at base (as in samoana, fig. 140), at apex (as in bucerotina, fig. 67) or broadly along anal margin of wing (as in dioxyrhina, fig. 72). The vestiture of body and legs has a similar tendency.

Table 2. Comparison of Species-Groups of Icosta.

<table>
<thead>
<tr>
<th>Species-Groups</th>
<th>Americana</th>
<th>Hirsuta</th>
<th>Simplex</th>
<th>Minor</th>
<th>Parallelifrons</th>
<th>Plana</th>
<th>Longipalpis</th>
<th>Albiplenis</th>
<th>Meda</th>
<th>Pliosa</th>
</tr>
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<tbody>
<tr>
<td>Body weakly flattened</td>
<td>+</td>
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<td>Ocelli present</td>
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<td>Postorbit very short</td>
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<td>Frontal process broadly rounded</td>
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<td>Vibrissal area broadly rounded</td>
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<tr>
<td>Species-Groups</td>
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<td>Hiruta</td>
<td>Simplex</td>
<td>Minor</td>
<td>Parallelofons</td>
<td>Plana</td>
<td>Longipalpis</td>
<td>Albipennis</td>
<td>Media</td>
<td>Pilosa</td>
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<td>Orbital setae uniseriate</td>
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<td>Mesothoracic spiracle small, dorsolateral or lateral</td>
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<td>Prescutum lacking laterocentral bristles</td>
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<td>Scutellum long</td>
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<td>Mesopleural concavity weak</td>
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<td>Prosternum large</td>
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<td>Mesosternal lobes long</td>
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<td>Mesosternum with discal setae</td>
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<td>Metasternal processes absent</td>
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<td>Vein R2-3 apart from C before merging</td>
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<td>Cell 2bc long</td>
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<td>Cell 2m+1a posteriorly bare</td>
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<tr>
<td>Aula bare</td>
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<tr>
<td>Venter of femora largely bare</td>
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<td>Femora 1 moderately swollen</td>
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<tr>
<td>Setae on anterior surface of femora 1 evenly distributed</td>
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<td>Segments 3-4 of tarsi 1 apically symmetrical</td>
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<td>♂ Tibiae 2 lacking preapical spines</td>
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<td>♀ Tarsi 2 lacking peglike spines</td>
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<tr>
<td>Segments 1-3 of tarsi 3 apically symmetrical</td>
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<td>Basitarsi 3 lacking basal spines</td>
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<tr>
<td>Posterolateral lobes of syntergite 1+2 short</td>
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<td>Abdominal striolate area largely bare</td>
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<tr>
<td>♂ Tergite 3 present</td>
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<td>♀ Tergite 3 present</td>
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<tr>
<td>♂ Tergite 6 entire, hardly constricted at middle</td>
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<td>♀ Laterite 3 definable</td>
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<td>♀ Laterite 7 present</td>
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<td>♀ Pregenital plate present</td>
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<td>Aedeagus moderately long, moderately curved</td>
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<td>♂ Postgenital plate not Y-shaped</td>
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<td>Host specificity weak</td>
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</table>

Symbols: +, yes, moderately so; ‡, much so; −, no, not so; −−, much the reverse; ±, usually so; ⠎, usually not so.
Subgenus *Ornithopus* Aldrich, new status

**Type-Species.** *Feronia americana* Leach, by original designation.

**Distribution.** Worldwide; 23 species and subspecies: 8 in Oriental, 4 in Ethiopian, 5 in Australian, 6 in Neotropical, 5 in Neartic and 2 in Palaearctic Region. About half are widely distributed and 6 are not confined to one Region. In the Palaearctic and Neartic Regions, only 1 species each is endemic.

**Host Relationships.** Nearly half of the species and subspecies are polyxenous, another half of them, partly pleio- and partly oligo- or monoxenous. Preferred hosts are Accipitridae, Phasianidae, Megapodiidae, Columbidae, Psittacidae, Cuculidae, Strigidae and Ploceidae.

**Diagnosis.** Ocelli often present, or each represented by small pit, tergite 5 sometimes

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Fig. 13-20. *Icosta (Ornithopus)* species, heads, front view, magnifications varied.
present: these are the only characters unknown in other subgenera. Vibrissal area usually broadly rounded, seldom angular or subangular; wing-setulae varied in extent, usually not covering posterior 1/3-1/2 of cell \(2m+1a\) and entirety of \(1bc, 2bc, 2a\) and alula; \(\varnothing\) tibia 2 lacking preapical spines, \(\varnothing\) tarsus 2 lacking peg-like spines; tergite 3 usually present, tergite 6 normal in shape; aedeagus moderately long and slender. Sexual dimorphism weak. For other characters, see subgeneric key, couplet 5.

**Affinities.** This subgenus appears to be the least specialized and is, therefore, placed at the beginning of the genus. It is closest to *Icosta*, s.s. and shows little affinity to remain-

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**Fig. 21-27.** *Icosta (Ornithoponus)* and *I. (Ardmoeca)* species, thoraces, dorsal view, magnifications varied.
ing subgenera. Of its subdivisions, the Americana group appears to be the most generalized while the 4 others diversify in different directions. The name *Ornithoponus* is derived from Greek ὄρνις (genitive ὄρνηθος), a bird; πνε, a pain, a toil.

**KEY TO SPECIES AND SUBSPECIES OF Icosta (Ornithoponus)**

1. Ocelli either all well developed, or vestigial, or each represented by small pit on postvertex; frontal process (fig. 6, *australica, zumpti*, etc.) apically submembranous, in profile subangularly produced (often lobe-like) before decurved and rounded-off into vibrissal area; wing-setulae (fig. 37-39) extensive, cell 2m+1a largely or entirely setulose. Simplex group .............................................. 2

Ocelli entirely absent, postvertex at most with single discal pit or median fovea near anterior end; frontal process fully sclerotized, never as above described; wing-setulae varied in extent, usually posterior 1/3 to 1/2 of cell 2m+1a extensively bare. ........................................... 6

2 (1). Cell 2m+1a and alula (fig. 37-38) entirely setulose, 2a almost so, only with anal margin narrowly bare; laterite 3 never well pigmented and sclerotized; ocelli always all well developed; tergite 6 (fig. 42) not constricted at middle; aedeagus (fig. 41, 44) more bulged at base. Oriental ....................................................... 4

Cell 2m+1a (fig. 39) with bare stripe along basal 2/3 of vein 2A, alula entirely bare besides marginal cilia, cell 2a almost entirely bare, with only small setulose patch at antero-apical corner; laterite 3 in matured specimens ventrally well pigmented and sclerotized; ocelli often partly or entirely vestigial, or absent and each represented by small pit; tergite 6 more or less constricted at middle; aedeagus (fig. 155) less bulged at base. ...................................................... 3

3 (2). Setae on venter of laterite 3 similar in length and robustness to those on neighboring membranous area; tergite 6 weakly constricted at middle, its anterior margin not concavely curved. Neotropical Region .......................... plauanni

Setae on venter of laterite 3 markedly longer and more robust than those on neighboring membranous area; tergite 6 strongly constricted at middle, its anterior margin distinctly concave at middle. Africa. ......................................................... zumpti

4 (2). Vertical, notopleural and scutellar bristles normal, as dark as other major bristles and more than 2× as long as postvertex; palpus distinctly shorter than eye; wing not more than 6 mm long. .................................................. 5

Vertical, notopleural and scutellar bristles clearly paler than other major bristles and shorter than postvertex; palpus longer than eye; wing 6.9-7.5 mm long. Queensland. ................................................................. australica

5 (4). Abdominal dorsum (fig. 43) with conspicuous patch of 15± very long robust setae on each side between tergite 3 and spiracle 3; setae on ♀ abdominal venter distinctly uneven in length and robustness; apical section of aedeagus (fig. 44) uniformly slender. Celebes, New Guinea ........................................... simplex

Abdominal dorsum (fig. 40) lacking such setal patches, at most in ♀ occasionally with 1-4 longer, more robust setae amid ordinary ones; setae on ♀ abdominal venter fairly even in length and robustness; apical section of aedeagus (fig. 41) gradually narrowed apicad. Burma to Taiwan and Philippines. .......... maquilingensis

6 (1). Tergite 3 either present or not, tergite 5 never present; posterior 1/3 to 1/2 of cell 2m+1a bare; vibrissal area angular or broadly rounded, in latter case, either preseptom lacking lateroventral bristles (only ordinary setae) or palpus in profile less than 2× as long as wide. .................................................. 8

Both tergites 3 and 5 present; cell 2m+1a (fig. 30) virtually entirely setulose, very slightly bare at base or at posteroapical corner; vibrissal area always broadly round-
ed anteroventrally; prescutum always with laterocentral bristles; palpus in profile ca 2.2 as long as wide. Hirusta group

**7 (6).** Tergite 5 much larger than 3, occasionally very narrowly interrupted at middle; laterocentral bristles as long and robust as scutellar bristles; postvertex anteriorly broadly truncate; cell 2m+la with very small bare area at base. Western N. America

**hirusta**

Tergite 5 much smaller than 3, widely interrupted at middle; laterocentral bristles much shorter, finer than scutellar bristles; postvertex anteriorly subangular; cell 2m+la (fig. 30) with very narrow bare stripe at posteroapical corner. Mozambique

**tripelta**
8 (6). Cell 2bc (fig. 46-48) only 1/3 as long as 1bc, alula ventrally setose; prosternum (fig. 7, minor, etc.) 4-5× as broad as long and its anterior margin practically in line with that of mesosternum; tergite 3 always absent; orbital setae always uniseriate; prescutum always with distinct laterocentral bristles in addition to short ordinary setae; vibrissal area sharply angular and very slightly produced; color very pale, wing length less than 4.5 mm, cells 1m and 2m-+1a extensively setulose as in fig. 46-48. Minor group .......................................................... 18

Cell 2bc 1/2 to 2/5 as long as 1bc, alula bare on both surfaces; prosternum not as above, either much narrower in proportion or projecting much before mesosternum; tergite 3 almost always present, and vibrissal area almost always broadly rounded, when occasionally lacking tergite 3 (in nigra only) and vibrissal area anteroventrally subangulur (in nigra and dukei), then orbital setae multiserrate, color very dark and wing length more than 7.5 mm; prescutum lacking distinct laterocentral bristles, very rarely (in nigra) with part of its laterocentral setae distinctly longer but not more robust than remaining ones........................................ 9

9 (8). Vertical and humeral bristles as dark as bristles on antennal apex; wing more or less fuscous, cell 3r uniformly setulose, 1m almost so, at most (in suvaensis only, fig. 29) bare at basal 1/3; prescutum without distinct laterocentral bristles, when occasionally (in nigra only) some of laterocentral setae reaching transverse mesonotal suture, then body very dark and wing more than 7.5 mm long. Americana group ................................................................. 12

Vertical and humeral bristles distinctly paler than bristles on antennal apex; wing less than 5.5 mm long, practically clear hyaline, cell 3r (fig. 55-57) with narrow bare stripe along basal 1/3 to 1/2 of hind margin, basal 1/2 of 1m bare; prescutum with distinct laterocentral bristles. Parallelifrons group ............................................. 10

10 (9). Setae on ♀ abdominal membranous area (fig. 61) almost entirely pale, short, fine and arising from unusually large basal papillae which at dorsolateral area each has a diameter ca 2/3 setal length; ♀ dorsal membrane with 2 (1+1) small patches of 4-5 black strong bristles lying shortly before tergite 6; anterior surface of femur 1 with 3-4 pale spines near its midlength which are clearly paler than black bristles on dorsal surface; ♂ unknown. Komodo I. .............................................. papulata

Setae on ♀ abdominal membranous area largely black, fairly long and strong, their basal papillae normal in size, with diameter not more than 1/4 setal length; ♀ dorsal membrane either without such bristle-patches, or with such patches lying laterad to tergite 6; spines on anterior surface of femur 1 black, concolor with bristles on dorsal surface ........................................... 11

11 (10). Dorsal abdominal membrane in ♀ (fig. 58) without very strong bristles lateral to tergite 6, in ♂ (fig. 59) at each side with conspicuous patch of 30-40 long dense bristles posterolateral to tergite 3, these bristles all longer than longest bristles near abdominal apex; bristles on ♀ tergite 6 never distinctly longer (usually shorter) than tergite itself; ♀ urogenital area flanked at each side by conspicuous patch of numerous dense bristles. New Guinea, Australia ...................... parallelifrons

Dorsal abdominal membrane in ♀ with conspicuous group of 3-4 very strong bristles lateral to tergite 6 at each side, in ♂ (fig. 60) without above-described bristle-patch near tergite 3; bristles on ♀ tergite 6 ca 2× as long as tergite itself; ♀ urogenital area flanked by few sparse bristles which never form conspicuous patches. Australia .................................................. paramonovi

12 (9). Orbital setae largely uniseriate, plus a few irregularly arranged ones; vibrissal area broadly rounded off; cells Ir and 1bc of wing largely bare; prescutum with 10-20 (usually 11-12) laterocentral setae arranged in 1-2 series ........................................ 14

Orbital setae clearly multiserrate; vibrissal area angular or subangular; cells Ir and
Ibe entirely setulose; prescutum with 40-50 laterocentral setae in 3-4 series.  

13 (12). Tergite 3 absent in both sexes; prosternum distinctly transverse, with only few soft setae; laterocentral setae of prescutum soft, pale, partly reaching transverse mesonotal suture. New World, Hawaii.................................. nigra

Tergite 3 present in both sexes; prosternum almost as long as wide; laterocentral setae of prescutum stout, black, almost uniform in length, all far from reaching transverse mesonotal suture. Africa............................................. dukei

14 (12). Mediovertex distinctly longer than palpus and than facial width; width of frons proper at base markedly smaller than its shortest distance to eye-margin; inner margin of frontal process in dorsal view virtually straight; dorsal striolate area of abdomen in American species more or less extensively setulose.  

Mediovertex distinctly shorter (10:13) than palpus and than facial width; width of frons proper at base hardly smaller than its shortest distance to eye-margin; inner margin of frontal process in dorsal view curved in S-shape; dorsal striolate area almost bare; wing 5.8-7 mm long. Neotropical Region.................................. latifacies

15 (14). Cell lm of wing uniformly setulose, at most bare at extreme base, 2m+1a bare at posterior 1/3 to 1/2. New World................................. angustifrons

Cell 1m (fig. 29) bare at basal 1/4 to 1/3, 2m+1a bare at basal as well as posterior 1/2; wing 6.5 mm long. Fiji Is................................. suvaensis

16 (15). Wing 7-8.5 mm long; abdominal syntergite 1-2 laterally with 4-6 heavy spines at each side, laterite 2 with 2-4 heavy spines; dorsal striolate area extensively setulose; urogenital area flanked by numerous long bristles.  

Wing 5-6 mm long; syntergite 1-2 with 1-2 heavy spines at each side, laterite 2 without heavy spines; dorsal striolate area less extensively setulose; urogenital area flanked by few long bristles; face not, or hardly, wider than eye............................................. rufiventris

17 (16). Face not, or hardly, wider than eye, interdistance of bases of vertical bristles subequal to that of outer margins of antennal appendages and much less than eye-length; anterior mesosternal lobe distinctly produced, its bristle closer to anterior than to lateral margin (fig. 7); laterite 7 usually more than 2X as long as wide; aedeagus (fig. 157) weakly bulged at extreme base.  

Face much wider than eye; interdistance of bases of vertical bristles much smaller than that of outer margins of antennal appendages and hardly smaller than eye-length; anterior mesosternal lobe hardly produced, its bristle equidistant to anterior and lateral margins (fig. 7); laterite 7 usually about as long as wide; aedeagus (fig. 159) not bulged at base............................................. americana

18 (8). Vertical and notopleural bristles pale and subequal in length to each other; latero-central bristles and latero-central setae of prescutum entirely pale.  

Vertical and notopleural bristles black, former much shorter than latter; latero-central bristles of prescutum long and black, latero-central setae short and pale, in strong contrast. Australia............................................. sp. “W”

19 (18). Metapleurotergal callus with only pale soft setae, no spines, at most occasionally with 1-2 black stiff setae at right or left side; setae on abdominal venter (fig. 49-50) near spiracle 3 hardly longer than width of their basal papillae.  

Metapleurotergal callus with 2-3 black spines and 3-4 black stiff setae; setae on abdominal venter (fig. 53) near spiracle 3 ca 2X as long as width of their basal papillae; outer margin of segment 1 of hind tarsus (fig. 144) with 0-5, usually 0-3 sensilla, that of segments 2-4 altogether with 0-3, usually 0-1 sensilla. Thailand, Taiwan, Malaysia, Philippines............................................. lonchurae

20 (19). Lateral fence of urogenital area (fig. 50) composed of 10± robust setae which are much longer than width of infra-anal plate; setae around abdominal spi-
racle 3 distinctly more robust than those around spiracles 4 and 5. Lateral fence of the urogenital area (fig. 49) composed of 5+ robust setae which are hardly longer than width of infra-anal plate; setae around abdominal spiracles 3-5 almost uniformly fine; hind tarsus (fig. 145) lacking minor spines under segment 1 near outer (anterior) apical corner but usually with single sensilla on outer margin of each of segments 2-4. Africa, extending to Mediterranean Basin.

21 (20). Female hind tarsus always lacking minor spines under segment 1 near outer apical corner and lacking sensilla under segments 2-4 on outer margin. India; (?) Afghanistan. Female hind tarsus (fig. 146) usually with 1-2 more or less well developed minor spines under segment 1 near outer apical corner and with 1-2, occasionally 3 sensilla under each of segments 2-4 on their outer margin. India; (?) Afghanistan.

Distribution. Nearly worldwide (not found in Palaearctic Region); 7 species: 5 in Neotropical Region (4 spreading to Nearctic), 1 in Ethiopian, and 2 in Australian. Most species are widely distributed.

Host Relationships. 3 species polyxenous, 1 pleioxenous, 1 oligoxenous, 2 remaining species with uncertain host relationships. Largely preferring or restricted to Falconiformes and Strigiformes.

Diagnosis. Characterized by a combination of negative characters (see Table 2). Sexual dimorphism very weak, chiefly with details of abdominal chaetotaxy. Vibrissal area rounded, occasionally subangular; orbital setae uniseriate, occasionally multiseriate; palpus long or moderately long; laterocentral bristles absent, very rarely poorly developed; wing-setulae never very extensive, cell $2m+1a$ never entirely setulose; abdominal membrane lacking patches of bristles, tergite 3 and 7 almost always present.

Affinities. This group is related to Hiruta and Simplex groups and to a lesser extent, to Minor group. Although placed at the beginning of the genus, the group has already undergone speciation in certain direction. Members of the group may be allotted into 3 subgroups:

(a) Medium to large size; vibrissal area rounded; no laterocentral bristles; orbital setae uniseriate; wing-setulae fairly extensive, cell $Im$ entirely setulose, $2m+1a$ with only posterior 1/3 to 1/2 bare. Neotropical and Nearctic Regions, chiefly on Falconiformes and less frequently on Strigiformes, too; 4 species (americana, rufiventris, angustifrons, latifacies).

(b) Large size; vibrissal area subangular; laterocentral setae sometimes partly much longer (but not more robust) than remaining ones; orbital setae multiseriate; wing-setulae as in subgroup (a). Nearctic, Neotropical, Ethiopian and Australian Regions, on Falconiformes; 2 species (dukei, nigra).

(c) Medium size; vibrissal area broadly rounded; no laterocentral bristles; orbital setae uniseriate; wing-setulae not so extensive as in subgroups (a) and (b), cell $2m+1a$ with very large bare area at basal as well as posterior 1/2, $Im$ basally with fairly large bare area. Australian Region; 1 species (suaensis).
Icosta (Ornithoponus) americana (Leach) Fig. 2, 6, 7, 159.

Feronia americana Lch., 1817a: 11, pl. 27, fig. 1–3. Type: ♀ (BMNH), ex (?) bird, Georgia, U.S.A.

Hippobosca bubonis Packard, 1869: 417, fig. 340, ♂. Type: ♂ (MCZ), ex Bubo v. virginianus, Massachusetts.

Olfersia americana: Ferris & Cole, 1922, Parasitology 14: 194, fig. 11-12, ♂.

Lynchia americana: Ferr., 1927a: 248, fig. 2-3, ♂ (♀ fig. 3 wrongly labeled L. hirsuta); 1930c: 67, fig. 5 A, D, F.—Beq., 1955: 272, fig. 14 F, 52-55, ♀ ♂.

Material. About 50 fresh specimens from Illinois, Ohio, California, Mexico, Colombia, Peru, Venezuela, Brazil and Argentina were examined. Among them, the following ones seem to represent new distributional and host records. PERU: 1 ♀ (CNHM), Lamberque, Chongoyape, 240 m, ex Tyto alba contempta, III.1954, Kalinowski. 1♂, 2 ♂♀ (CNHM), Apurimac, Andahusylas, Hoamozobamba, 2300 m, ex T. alba, X.1953, Kalinowski. BRAZIL: 3♀♂ (CNHM), Nova Teutonia, Santa Catarina, ex Astro flammeus, I-II. 1957, Plaumann.

Habitats. Common in southern Nearctic Region, relatively less abundant in Neotropical Region (? due to insufficient collecting). No reliable published records for the W. Indies. So far known from Canada (Ontario, Quebec to 48°10’N), U.S.A. (all 49 continental States except Alaska, Arkansas, Idaho, Montana, New Mexico, Oklahoma, S. Dakota, Utah, Wyoming), Mexico, Honduras, Costa Rica, Panama, Peru, Colombia, Guiana, Venezuela, Brazil, Bolivia and Argentina (to 30°S). Polyxenous, probably breeding on Falconi-, Galli- and Strigiformes, with stray records from Ciconi-, Charadrii-, Columbii-, Pici- and Passeriformes. Bequaert’s (1955: 292-93, 1957: 577) analysis of 519 verified records is summarized below. Ciconiiformes: Ardeidae (Cosmerodius) 1 record; Falconiformes: Accipitridae 145 (Accipiter 52, Aquila 4, Buteo 69, Circus 4, Haliaeetus 3, genera indet. 12); Falconidae 4 (Caracara 1, Falco 3); Pandionidae (Pandion) 1; Galliformes: Phasianidae 77 (Bonasa 57, Colinus 9, domestic Gallus 1, introduced Phasianus 10); Meleagridae (wild Meleagris) 5; Charadriiformes (Philohela) 1; Laridae (Sterna) 1, Alcidae (Uria) 1; Columbiformes: Columbidae 2 (Columba 1, Zenaida 1); Strigiformes: Strigidae 275 (Aegolius 1, Asio 9, Bubo 141, Cicada 1, Glaucomidium 2, Otus 38, Pulsatrix 1, Rhinatynx 1, Speotyto 5, Strix 44, Tyto 13, genera indet. 19); Piciformes: Picae (Dryocopus) 1; Passeriformes: Fringillidae (Zonotrichia) 1; Corvidae 5 (introduced Calocitta 1, Corvus 4). To the above list, the genera Mierastur (Falconidae) and Pedioecetes (Phasianidae) should be added as recorded hosts.


Systematics. This species, as accepted by Bequaert (1955) and in this paper, is very variable in certain features. The extremes of the variations seemingly represent 2 distinct species which were called "fuscus" Macq. and americana, respectively, by Bequaert (1933b, 1945b). The former form was said to be separable from the latter in having color darker,
body size smaller (wing length 6.5-7 vs 7-8.5 mm), frons proper usually narrower, frontal processes less spreading, inner orbits subparallel or slightly diverging (not strongly so) toward postvertex, postvertex rather long and semi-elliptical (not short, nor transversely elongate), median ocellus rudimentary or represented by median pit on postvertex (americana was said to have no median ocellus and usually no median pit) and in occurring mainly in western N. America and south of the Mexican border (americana was said to be restricted to eastern Nearctic Region) and more specific on Strigidae. Unfortunately, I do not have enough adequate material from different countries, hosts and seasons to evaluate and analyze the differences mentioned, to see if they are linked with other structural details. In 1955, Bequaert is said to have examined over 1500 specimens of americana, but in 1962 and 1966 I could only find about 200 specimens in the Mus. Comp. Zool., Harvard. The problem is further complicated by the fact that the relative facial width, i.e., the chief criterion used by Bequaert (1955: 267) for the separation of americana and rufiventris is by no means constant. Although there seem to be no actual transitional specimens in this respect (Beq. 1955: 314), the characters enumerated in the key, couplet 17, will have to be revised later with ample material. The inner orbit in rufiventris is stated by Bequaert (1955: 313, as wolcotti) to be relatively narrow, usually 1/3 as wide as mediovertex, the palpus to be somewhat longer than in americana, being, slightly shorter than mediovertex, and the humeral callus to be more acute and more slender. These differences, as admitted by Bequaert, are difficult to appreciate. The palpus, head in profile, prosternum and ♀ genitalia are as in fig. 2, 6, 7 and 159, respectively.

Both Bequaert (1955) and I (1963) gave a long list of synonyms of americana. A fresh re-examination of the types in question revealed that all are referable elsewhere except bubonis Pack, plus the nomina nuda falconis Harris and aquilae Brodie & White. It should be added that in the latter article, the authorship of Ornithomya fusca was wrongly accredited to Guérin-Méneville rather than his co-author Percheron.

Icosta (Ornithoponus) rufiventris (Bigot)  Fig. 4, 7, 10, 12, 157.

(?) Ornithomyia fusca “Macquart” Perch., 1838: pl. 6. Type: lost, ex (?) bird, no locality.

Olfersia fusca Mcq., 1845: 346. Type: ♂ (BMNH), ex (?) bird, Nova Grenada. Name preoccupied by Perch. 1838.

Ornithomyia rufiventris Bigot, 1885: 243. Syntypes: (BMNH), ex (?) bird, Brazil.


Lynchia wolcotti: Beq., 1955: 311, fig. 59, 60A, ♀ ♂.

Material. About 20 fresh specimens from Costa Rica, Venezuela, Surinam and Brazil were examined. Among them, the following I provides a new record for Guiana. SURINAM: 1♀ (LDN), w. mallophagan on hindleg, nr Avanavera Falls, Kabaleco R., IX. 1965, Mees.

Habitats. With somewhat similar distributional and host ranges as in americana Lch, but much rarer in the Nearctic Region than the latter species, so far known from 18 localities in the U.S.A. (Michigan up to 46°20'N, Nebraska, New Hampshire), Mexico, Costa Rica, Panama, Guiana, Venezuela, Brazil down to 27°11'S, Bolivia and Argentina. Probably breeding on Falconi- and Strigiformes. Bequaerti's (1955: 313, 1957: 577) analy-
sis of 23 verified records may be summarized below. Falconiformes: Accipitridae 11 records (Accipiter 1, Buteo 4, Hypomorphus 1, Leucopternis 1, Urubitinga 1, genus indet. 1); Falconidae (Micrastur) 3; Strigiformes: Strigidae 9 (Asio 2, Ciccaba 1, Glaucidium 2, Otus 1, Rhinopynx 1, Tyto 1, genus indet. 1).

Systematics. Rufiventris stands intermediate between americana and angustifrons both in size and structure. It is so closely similar to americana that once under the name wolcotti, it was suppressed as a synonym (Beg. 1933b: 78). For their differences, see discussions under americana. The palpus, prosternum, fore tarsus, hind tibia and genitalia are as in fig. 4, 7, 10, 12 and 157 respectively.

The identity and generic status of Ornithomya fusca Perch. 1838 are quite uncertain. Percheron attributed the authorship of the name to Macquart. This meant fairly possibly that the specimen(s) involved might have been received from or identified by Macquart. Furthermore, Percheron clearly described and illustrated his species as having enfumed wings. Therefore, as far as I can guess, fusca Perch. is perhaps identical with fusca Mcq. or nigra Perty rather than, as suggested by Bequaert (1933b: 79), referable to Ornithocoton, a genus never having enfumed wings. Percheron's specific description reads "Long. 5 lignes. Tête fave foncée, avec deux bandes brunes au bord interne des yeux; thorax et pattes en dessus d'un brun luisant; abdomen, pattes et thorax en dessous, fauve livide; abdomen d'un brun rougeâtre; ailes d'une teinte de fumée parfaitement égale. J'ignore la partie de cet insecte, que je sais cependant exotique." His generic description is much longer (nearly 2 full pages) and it was admitted, "Les détails de ce genre ont été pris sur l'O. aviculaire." From such remarks and from the different wing shapes in the figures, it is quite obvious that only the 2 unnumbered ones of his figures (in the upper part of that plate) were based upon his fusca, the remaining ones, all numbered and all referred to in the generic description, were based upon what Percheron then called Ornithomya aviculaire. Bequaert (l. c.) concluded that fusca Perch. has "evidently nothing in common with" fusca Mcq. on the ground that the former is very large in size and that the ocelli were stated by Percheron to be present. As observable in Percheron's uppermost figure showing the natural size of the insect, the length was apparently measured from the tip of head to tip of wing, not of abdomen. Secondly, the statement about the presence of ocelli was included in the generic, not specific, description and is thus not necessarily referable to fusca Perch. From Percheron's unnumbered figures and other evidence explained above, fusca Perch. 1838 seems most likely to belong to Icosa. Although its synonymy with fusca Mcq. 1845 is uncertain, it appears best to invalidate the latter name as a junior homonym and to resurrect rufiventris Bigot as the name for this species.

Icosa (Ornithoponus) angustifrons (van der Wulp) Fig. 2, 7, 10, 11, 160.

Olfersia angustifrons Wulp, 1903: 430, pl. 13, fig. 3, ♂♀. Type: ♂ (BMNH), ex (?) bird, Costa Rica.

Lynchia angustifrons: Ferr., 1930c: 68, fig. 5E, G.—Beg., 1955: 305, fig. 57-58, ♀.

MATERIAL. Among 10+ fresh specimens examined, the following ones deserve listing.

SURINAM: 1 ♀ (CNHM), Wilhelmina Mts, West R., 700 m, ex Hypomorphus u. urubitinga, XI.1961, Beatty. 1 ♀ (CNHM), Paramarito, Paloemeu Airstrip, Tapanohoni R., ex Harpa-
gus b. bidentatus, VI.1961, Beatty.

Habitats. All over continental Neotropical Region, often a summer visitor to the Neartic Region, so far known from Canada (Ontario 43° 12' N), eastern U.S.A. (Illinois, Indiana, Maryland, Massachusetts, Michigan, Minnesota to 46° N, Missouri, New Hampshire, Pennsylvania, Texas, Virginia, Wisconsin), Mexico, Honduras, Guatemala, Nicaragua, Costa Rica, Panama, Guiana, Colombia, Venezuela, Brazil to 27° S, Paraguay. The lack of records from the western U.S.A. and western South America is noteworthy. Probably breeding on Falconiformes, with stray records from Charadrii-, Psittaci-, Strigi-, Trogoni-, Coracii-, Pici- and Passeriformes; Bequaert's (1955: 308-09, 1957: 577) analysis of 55 verified records is summarized below. Falconiformes: Accipitridae 25 records (Accipiter 7, Busarellus 1, Buteo 4, Circus 1, Elanus 1, Hypomorphus 4, Ictinia 2, Leucopternis 1, Odontirochis 1, genera indet. 3); Falconidae 9 (Falco 1, Herpetotheres 1, Micrastur 5, Milvago 2); Cathartidae (Cathartes) 1; Charadriiformes: Capella 1; Psittaciformes: Psittacidae (Amazona) 1; Strigiformes: Strigidae 7 (Ciccaba 2, Glaucidium 3, Strix 1, genus indet. 1); Trogoniformes: Trogonidae (Trogon) 1; Coraciiformes: Momotidae (Momotus) 1; Piciformes: Ramphastidae 6 (Pteroglossus 1, Ramphastos 5); Passeriformes: Cotingidae (Pyroderus) 1; Muscicapidae (Hylocichla) 1; Corvida (Cyanocorax) 2. To the above list, the genera Baryphthengus (Momotidae), Veniliornis (Picidae) and Pitylus (Fringillidae) should be added as recorded hosts.

Systematics. As evidenced by the shape of the palpus and relative density of the setae on the dorsal striolate area of the abdomen, angustifrons obviously stands intermediate between americana and rufiventris on one side and latifacies on another. From the last species, which is known to me only from dry specimens and original description and which is about the same in body size, it differs in having markedly shorter palpus, narrower face, more generalized shape of frontal process and less developed ♀ laterite 7. From americana and rufiventris, the differences are smaller size, relatively longer and narrower palpus and aedeagus, more acute humeral callus, fewer setae on prescutum and abdominal striolate area, fewer spines on syntergite 1+2, and fewer long bristles on tergite 6 and on lateral sides of ♀ urogenital area. The ♀ laterite 7 was stated and illustrated by Bequaert (1955: 309, fig. 57A) to be absent. This is not quite true since, at least in specimens at hand, it is "raised, bristly and knob-like" (but not "soft") and is about same in size and shape as that found in rufiventris. The unusually narrow face, as suggested by the name angustifrons, makes it superficially very similar to rufiventris. Meanwhile, this character appears to be more constant than in the latter species. The palpus, prosternum, fore tarsus, hind tibia and ♀ genitalia are as in fig. 2, 7, 10, 11 and 160, respectively.

Icosta (Ornithoponus) latifacies (Bequaert)

Lynchia latifacies Beq. 1955: 302, fig. 56, ♀ ♂. Type: ♂ (MCZ), ex (?) bird, Brazil.

Material. No fresh material available.

Habitats. Probably widely spread over Neotropical Region; so far known only from Colombia, Brazil and Paraguay. The only recorded host is Cuculiformes: Cuculidae (Piaya cayana).

Systematics. Very rare in collections. The only published illustrations were by Bequ-
aert (l. c., fig. 56A–E). Readily recognizable from americana, rufiventris and angustifrons by using the key, couplet 14, and apparently more specialized than those 3 species, among which it is comparatively closer to angustifrons (q. v.). The shape of frontal process in dorsal view in latifacies, recessa, jactatrix and elbell apparently provide an example of convergent evolution among hippoboscid flies parasitic on Cuculidae.

Icosta (Ornithoponus) dukei (Austen)  

Fig. 3, 7, 13, 28, 31, 32.

Olfersia dukei Aust., 1911: 171, ♀. Type: ♀ (BMNH), ex Haliaeetus v. vocifer, Uganda. Lynchia dukei: Beq, 1933b: 80; 1945b: 102.—Maa 1964: 89, fig. 1.—Theod. & Oldr. 1964: 49, fig. 78, ♂♀.

Material. 6 ♂♂, 8 ♀♀.

CAMEROONS: 1 ♂ (MCZ), Yaoundé, ex Circaetus cinereus, XI. 1952, Monez; 1 ♀ (SAIMR), Yaoundé, ex Lophaetus occipitalis, II. 1958. 1 ♀ (MCZ), Batanga, ex Urotiorchis macrurus #1457, Reis.
SENEGAL: 1♀ (MCZ), Tonkoui C. I., Ifan, 900–1200 m, ex Tauraco persa, IX.1946, Villiers.

CONGO: 1♀ (MAC), Katanga, Pweto, ex Epervier [sparrow-hawk], VII.1946, Vincke. 3♂♀ (MAC), Mamema, Kasango, Lualaba, ex Gymnogenys typicus, VII.1959, Benoit. 2♂♀ (MAC), Uele Bambesa, ex G. typicus, XII.1938, Vrijdagh. 1♀ (MAC), Tshuapa, Imbonga, ex Milvus aegyptius tenebrius, XII.1952.

RUANDA: 1♀ (MCZ), Kigali, ex M. migrans parasiticus, IV.1953, Fain. 1♂ (MCZ), Astrida, ex Buteo rufusfuscus augur, II.1953, Fain; 1♀, 1 puparium (MCZ), id., ex Gymnogenys typicus.

NYASALAND: 1♂ (MCZ), Lake Nyasa, Mtimbuka, ex Haliaeetus vocifer, II.1949, Loveridge.


Habitats. W. and E. African Subregions, at present known from Senegal, Ivory Coast, Cameroons, Congo, São Tomé I., Angola, Ethiopia, Nyasaland, Ruanda, Uganda, Tanganyika and Kenya. Obviously breeding on Falconiformes: Accipitridae (Aquila, Buteo, Circus, Gymnogenys, Gypophierax, Haliaeetus, Hieraaetus, Lophaetus, Milvus, Terathopius, Urotriorchis). The odd record ex Cuculiformes: Musophagidae (Tauraco) was most probably a stray. Highest density per infested bird was 2♀♀, 8 ♀♀ ex a Haliaeetus vocifer Daudin (Beq. 1953a: 232), which is probably the most preferred host.

Systematics. In the original description, dukei was stated to be different from intertropical (=nigra) in having more elongate palpus, more setose inner orbit and more transversely elongate postvertex. These differences were considered unreliable by Bequaert (1933b: 70, 80; 1945b: 89, 102; 1955: 323) and dukei was thus sunk as a synonym of nigra. The former was later revived as a distinct species by the same author (1957: 578) on discovering the absence of its tergite 3 in both sexes. In fact, these 2 species, being similar in color pattern, body size and host relationships, can also be distinguished by the shape of prosternum (fig. 7), the nature of laterocentral setae (stout and black in dukei, soft and pale in nigra) and details of abdominal chaetotaxy (fig. 31) and genitalia (compare fig. 32 & 158). The palpus, head and wing are as in fig. 3, 13 and 28, respectively.

Icosta (Ornithoponus) nigra (Perty) Fig. 4, 6, 158.

Hippobosca nigra Perty, 1833: 190, pl. 37, fig. 15. Type: ♀ (Munchen Mus.), ex (?) bird, Brazil.

Olfersia fascipennis Macq., 1835: 640. Type: lost, ex (?) bird, Brazil.

(?) Ornithomya fusca “Macquart” Perch., 1838: pl. 6. Type: lost, ex (?) bird, no locality.

Olfersia mexicana Macq., 1843: 435. Type: ♂ (Paris Mus.), ex (?) bird, Mexico.

Ornithomyia intertropical Wk., 1849: 1144. Type: ♀ (BMNH), ex (?) bird, Galapagos.

Olfersia macquetii Rndn., 1878: 160. Type: ♀ (Firenze Mus.), ex (?) bird, Nova Grenada.

Olf. pallidilabris Rndn., 1878: 161. Type: presumably lost, ex (?) bird, Mexico.

Olf. obliquinervis Rndn., 1878: 162. Type: presumably lost, ex (?) bird, Mexico.
Ornithomyia villadae Duges, 1887: 20, pl. 3, fig. 3. Type: lost, ex Buteo jamaicensis calurus and B. swainsoni, Mexico.

Olfersia acarta Speis., 1902b: 149; republished as n. sp. in 1902c: 87. Type: destroyed; neotype ♀ (Bishop), ex Asio flammeus sandwichensis, Hawaii.

Olf. raptorum Lutz, 1915: 181, pl. 28, fig. 3. Type series (no lectotype ever selected) (Inst. Osw. Cruz Rio de Janeiro), ex Caracara plancus brasiliensis, Milvago ch. chinchamach, Leucopetra polionota, Cathartes aura ruficollis, Brazil.

Lynchia intertropica: Ferr., 1930: 69, fig. 5 B, C, H.

L. nigra: Beq., 1955: 314, fig. 60 B-G, 61, 62, ♀ ♂.

Material. 40± fresh specimens from Arizona, Mexico, Brazil, Galapagos. Details of their collection data are not given here since they contain no new distributional and host records.

Habits. Widely spread in Neotropical Region, sporadically occurring (seasonally?) in Nearctic Region, at present known from Canada (Alberta to 51° N, Brit. Columbia, Quebec), U.S.A. (Arizona, Colorado, Idaho, Kansas, Minnesota, Montana, New Mexico, New York, Texas, Utah, Washington, Wisconsin, Wyoming), Mexico, Honduras, Panama, Venezuela, Guiana, Brazil, Bolivia, Argentina to 28° S, and Galapagos. Its absence in the W. Indies is noteworthy. The species is also found in the Hawaiian Is. and generally believed to have been introduced rather recently. The 1♂, 1♀ (KBH), Oahu, ex "hawaiiske Ugle" and 1♂ (KBH), Hawaii I., 1845-47, Voyage Galatea probably represent the earliest catches in those Islands. The record of its occurrence at Cooktown, Queensland (Bau, 1929b, Zool. Anz. 85: 10, as intertropica) is obviously unreliable. Apparently breeding on Falconiformes. Analysis of 66 verified New World records (Beq. 1955: 320-21) is Falconiformes: Accipitridae 43 records (Accipiter 1, Aquila 1, Buteo 22, Buteogallus 2, Circus 1, Gampsonyx 1, Geranospiza 1, Heterospizias 1, Ictinia 1, Leucopternis 1, genera indet. 11); Falconidae 17 (Caracara 2, Daptrius 1, Falco 8, Herpetotheres 5, Milvago 1); Cathartidae (Cathartes) 3; Cuculiformes: Cuculidae (Piaya) 1; Strigiformes: Strigidae 2 (Bubo 1, genus indet. 1). The complete list of recorded hosts also includes Strigidae (Rhinotynx).

Systematics. As pointed out under rufiventris, because of the body size and wing color, fusca Perch. might be referable here. Incidentally, macquartii Rndn., being actually referable here, was also considered by Macquart to be his fusca. This coincidence further strengthens the possibility of the synonymy of fusca Perch. with nigra.

Ornithomyia villadae was suggested by Bequaert at first (1933b, 1945b) to be possibly synonymous with americana and later (1955), to be with nigra. From its original description and known hippoboscid-fauna of its hosts, there is little doubt that villadae and nigra are synonymous. Evidence supporting this probability is: The body was said to be shining blackish brown, wings smoky, length to tip of folded wings 13 mm, ocelli absent; the face was drawn as wider than eye, palpus much longer than frons; and the only known hippoboscids of the type hosts Buteo jamaicensis calurus and B. swainsoni are Ornithoica vicina and Icosta nigra.

Among the American species, nigra occupies an isolated position in having size large, vibrissal area subangular, inner orbit and thoracic dorsum more richly setose, palpus longer, and ♀ laterite 7 well developed. Its closest relative is the African species dukesi (q.v.) which was once suppressed as a synonym of nigra. The palpus, head in profile and ♀ genitalia are as in fig. 4, 6 and 158, respectively.
In Bequaert’s (1955: 317, fig. 60 D) drawing of a ♀ from Honduras, the lateroentral setae of prescutum were shown as uniformly short and all far from reaching transverse mesonotal suture. It is impossible to check whether it represents individual variation or something else. But all Hawaiian and Brazilian specimens at hand have some of those lateroentral setae clearly reaching the suture.

**Icosta (Ornithoponus) suvaensis** (Bequaert)  
*Fig. 29, 33, 152-154.*

*Lynchia suvaensis* Beq., 1941b: 283, fig. 5, ♀. Type: ♀ (BMNH), ex (?) bird, Fiji.—Maa 1962: 599, fig. 2, ♀.

**Material.** FIJI: 1♂ (USNM), Vunisea, ex hawk, Mann. 1♀ (BMNH), Suva, ex feathers of a parrot, XII. 1908, Knowles.

**Habitats.** Fiji Is., lowland; host relationships not clear.

**Systematics.** In the original description, Bequaert compared *suvaensis* with all "*Lynchia*

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**Fig. 33.** *Icosta (Ornithoponus) suvaensis* Beq., ♀ abdomen and genitalia.
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species then known from the Orient. Since none of the latter belongs to the Americana group, its affinities with any of those are either remote or superficial. Apparently sua- ensis serves as a link, both in structure and in distribution, between the hawk-infesting species (americana, rufiventris, angustifrons) of the Americas and the parrot-infesting species (parallelifrons, paramonowi) of Australia-New Guinea. Incidentally, the only host records of this species are a hawk and a parrot. The abdominal chaetotaxy and genitalia of this species are illustrated here for the first time.

♂. Color dark, wing fuscous. Head: Occipital margin straight except near both ends; vertical bristle 2/3 as long as notopleural bristle; postvertex short. Face narrow, nearly parallel-sided. Frons proper long, shallowly broadly notched at middle; frontal process in dorsal view broad at base and gradually narrowed apicad, in profile anteriorly reaching same level as vibrissal area. Palpus about as long as smallest width of face. Vibrissal area broadly rounded. Gula posteriorly spinose. Thorax: Mesonotum 50 × 72; prescutum rather densely and strongly striate all over; scutellum 15 × 38, posterolaterally rounded, posteriorly distinctly convex. Mesopleurotergal callus with 5-6 stout spines. Prosternum well sclerotized, transversely lanceolate, with pair of soft setae; anterior margin of mesosternum deeply, roundly notched. Wing (fig. 29) 6.3-6.5 mm long; setulae rather extensive, leaving cells 2bc and 2a entirely bare, lm basally with large, irregularly shaped bare area, 2m+1a largely bare, antero-apically setulose. Basitarsi 1 and 2 as in fig. 152 and 153, respectively. Tarsal spines 1.1.1.0/2.1.1.0/4.2.2.1; tarsomere 1 (fig. 154) of hindleg 28 × 11, longer than 2+3+4 and than 5, ventrally with 3 spine-like setae near basal spine; tarsomere 2 of same leg as long as wide. Abdomen (fig. 33) medially finely setose, laterally robustly so; dorsal striolate area almost entirely bare. Syntergite 1+2 laterally strongly spined; laterite 2 with similar spines; tergite 3 large, wide; laterite 3 undefinable; tergite 6 posteriorly deeply broadly notched, with 8 pairs of bristles; urogenital area fenced by setae slightly longer than elsewhere, and laterally flanked by a long strong bristle lying anterolaterad to spiracle 7. Aedeagus fairly long, slender and apically straight; paramere apically straight and narrowly rounded. Postgenital plate apically subtruncate, with few setae, not bilobed.

♀. Similar. Wing 7 mm long. Laterite 3 moderately sclerotized, laterite 7 not definable. Urogenital area fenced by strong setae. Postgenital plate with few setae near midlength.

Hirsuta Group

Distribution. 2 species: 1 each in Nearctic (California) and Ethiopian (S. African) Regions.

Host Relationships. Unknown in 1 species, oligoxenous on Galliformes (Phasianidae) in another.

Diagnosis. Both tergites 3 and 5 present. Sexual dimorphism fairly weak except in chaetotaxy on tarsus 2 and abdominal venter.

Affinities. Intermediate between Americana and Simplex groups, slightly closer to the former than to latter (Table 2); differing from both, in addition to the presence of tergite 5, by the strongly developed laterocentral bristles on prescutum. The tergite 5 simulates that in Pseudolychnia but otherwise the Hirsuta group has no close affinities with that genus. The 2 species included are not quite closely related, and perhaps they should be assigned to 2 independent species-groups. They differ from each other in the nature of tergite 5, shape of postvertex, tergite 3 and cell 2he and other characters (see under tripelta).
Icosta (Ornithoponus) hirsuta (Ferris)  

Fig. 3, 7, 10, 11, 34–36, 149.

Lynchia hirsuta Ferr., 1927a: 249, fig. 1, 4, ♀ ♂. Type: ♀ (UCB), ex Lophortyx c. californica, California.—Beq., 1955: 349, fig. 51, 66, ♀ ♂.

Material. 80+ specimens, including type series, specimens recorded by Bequaert (l.c.) and those kindly supplied by Dr I. B. Tarshis and Chicago Nat. Hist. Mus.

Habitats. Confined to Californian Subregion (California, Idaho, Nevada, Utah). The northernmost published record is 43°30’ N in Idaho and the southernmost, ca 33° N in California. Oligoxenous on Galliformes: Phasianidae (Centrocercus, Dendrapagus, Lophortyx, Oreortyx); also stray records from Passeriformes: Muscicapidae (Toxostoma), Fringillidae (Junco, Pipilo) and Corvidae (Cyanocitta). Bequaert (l.c.) listed 95 and 10 verified records for those 2 bird orders, respectively. The species is known to transmit Haemoproteus lophortyx O’Roke and to harbor Myialges (Promyialges) lophortyx Furman & Tarshis and M. (M.) anchora Trouessart.

Systematics. Ferris’ fig. 1 in the original description was mislabeled americana Lch. but this was corrected later (1929: 285). The puparium was described by O’Roke (1929)

Fig. 34–36. Icosta (Ornithoponus) hirsuta Ferr., genitalia (34), ♂ abdomen (35) and ♀ abdomen (36), showing sexual dimorphism of ventral chaetotaxy.
and Bequaert (l.c.); the palpus, presternum, fore tarsus, hind tibia, abdomen and genitalia and basitarsus 3 (fig. 3, 7, 10, 11, 34, 35 and 149, respectively) are here illustrated for the first time. The tarsal spine formula is 2.1.1.0/2.1.1.0/7(3+3+1).2.1.1 in ♂ (no peg-like spines on tarsus 2), and 2.1.1.0/2.1.1.0/8(4+3+1).1.1.1 in ♀; the aedeagus very slender and strongly recurved evenly. Tergite 3 is generally paler and less sclerotized than tergite 5. In 1♀ examined, it is narrowly interrupted at middle; and in 1♂, the tergite 5 is medially interrupted. The ventral setae near ♀ abdominal apex (fig. 36) are much stronger than in ♂.

Icosta (Ornithoponus) tripelta (Maa) Fig. 5, 7, 30, 150, 151.

Lynchia tripelta Maa, 1964: 93, fig. 11-15, ♀. Type: ♂, (Bishop), ex (?) bird, Mozambique.

Material. No fresh material available.

Habitats. S. African Subregion (Mozambique). No host record.

Systematics. This species is known from the unique ♀ type, and differs from hirsuta in the following characters (besides those mentioned in the key): color darker; palpus (fig. 5) shorter; cell 2bc (fig. 30) shorter (abscissa 1 of vein M1+2 much shorter than 2); ♀ tarsus 1 with 2.1.1.0 spines, tarsus 2 (fig. 151) with peg-like spines in addition to ordinary ones, tarsus 3 (fig. 150) longer and with more spines; abdominal setae particularly those on lateral and ventral areas longer; tergite 3 larger and poorly setose, dorsal striolate area more extensively setose, tergite 6 with fewer bristles; parameres very slender, nearly straight; aedeagus broader, curved at a point of basal 1/4 and at extreme apex. Quite obviously tripelta is much more specialized than hirsuta. The prosternum is as in fig. 7.

Simplex Group

Distribution. Pantropical; 5 species: 3 in the Oriental, and 1 each in Ethiopian and Neotropical Regions.

Host Relationships. The Oriental species are oligo- or polyxenous on ground birds (Phasianidae, Megapodiidae, Columbidae); the Ethiopian one polyxenous on Accipitridae and Musophagidae; the Neotropical one probably also on ground birds.

Diagnosis. Ocelli either well developed, vestigial or each represented by small pit on postvertex. Postvertex well separated from inner orbit. Frontal process submembranous apically, in profile subangulary (often lobe-like) produced forward before being decurved and rounded-off into vibrissal area. Wing-setulae extensive or very extensive. Vertical, notopleural and scutellar bristles occasionally discolored and shortened. Aedeagus in profile more or less broad at basal, slender and straight at apical section. Sexual dimorphism very weak.

Affinities. Nearest to Minor group, with some affinities to Plana, Hirsuta and Albipennis groups. With the Minor group, it shares the pale color pattern (except in zumpti), broad face, short postvertex, simplified chaetotaxy, extensive wing-setulae, absence of ♀ pregenital plate and laterite 7, short aedeagus and weak sexual dimorphism. In the general shape of head and of frontal process, it is somewhat similar to the Plana as well as Hirsuta group; and in the extent of wing-setulae, it is rather near the Albipennis group,
Within the Simplex group itself, the 5 species can easily be allotted to 2 subgroups which differ from each other not only in structure (see couplet 2 of the key) but also in geographical distribution and host relationships. Among the Oriental species which form together the 2nd subgroup, *maquilingensis* represents the smallest and least specialized and occurs in the NW corner of their overall range, whereas *australica*, the largest and most specialized, is in the SE corner. The discoloring and shortening of certain major bristles in the latter species bring it still closer to the Minor group.

*Icosta (Ornithoponus) plaumanni* (Bequaert) Fig. 4, 6, 7, 10, 12, 155.

*Lynchia plaumanni* Beq., 1943c: 132. ♀♂. *Type:♂*(MCZ), ex *Odontophorus c. capueira,*
Brazil.—Beq. 1955: 359, fig. 70 A–H, ♀♂.

Material. No fresh material available.

Habitats. Neotropical Region, at present known from Mexico, Guiana, Brazil and Bolivia. Host preference not clear, possibly breeding on Galliformes and other ground birds. Available records are Tinamiformes: Tinamidae (Crypturellus), Galliformes: Cracidae (Crax, Ortalis), Phasianidae (Odontophorus) and Passeriformes: Formicariidae (Chamaeza).

Systematics. Since first published, this species was redescribed by Bequaert (1955) and was placed on the top of the American forms of the genus. As mentioned, it is most closely allied to zumpti and differs from the latter in having triangular (not subtruncate) postvertex, slightly shorter palpus, denser and stronger abdominal setae, evenly broad (transversely) tergite 6 and much more slender aedeagus. The tarsal spine formula in ♂ is 2.1.1.0/2.1.0.0/3(2+1).1.1.1. The accompanying figures of palpus, head in profile, prosternum, fore tarsus, hind tibia and ♂ genitalia are based upon a paratype.

Icosta (Ornithoponus) zumpti (Maa) Fig. 5–7, 10, 39.

Lynchia zumpti Maa, 1964: 91, fig. 6–10, ♀♂. Type: ♀ (Bishop), ex Accipiter tachiro, S. Africa.

Material. 18 ♂♂, 23 ♀♀. CAMEROONS: 1 ♀ (MCZ), Batanga, ex Corythaeca cristata, coll. Good.

CONGO: 1 ♂ (MCZ), Tshibati, Kivu, ex Accipiter rufiventris, X.1954, Chapin.

ETHIOPIA: 1 ♂, 1 ♀ (BMNH), Maraco, X.1916, Kovaes. 1 ♀ (BMNH), "Ethiopia 1958".


UGANDA (all in MCZ): 2 ♂♂, 6 ♀♀, in 2 lots, Masaka Dist., ex Musophaga rossae, XII.1937 & II.1938, Hopkins. 2 ♂♂, 2 ♀♀, Mile 10, Kampala-Entebbe Rd, ex Corythaeca cristata, VIII.1937, Hopkins. 1 ♂, 3 ♀♀, Kampala, ex C. cristata, VIII.1937, Hopkins; 1 ♂, 2 ♀♀, id., M. rossae. 1 ♂, 3 ♀♀, in 2 lots, nr Kampala, ex C. cristata, VIII.1937, Hopkins. 1 ♀ w. mites on abd., Budongo Forest, ex Guttera edouardi setsmihi.

NYASALAND: 1 ♀ (MCZ), Cholo, ex hawk 390, IV.1928, det. Beq. as testacea Mcq. 1 ♀ (BMNH), Zomba, ex Falco, X.1962, Sweeney; 1 ♂ (BMNH), Zomba, ex owl, II.1910, Stannus.


Habitats. Widespread over Ethiopian Region excl. Madagascar, so far known from Cameroon, Congo, Ethiopia, Kenya, Uganda, Nyasaland, Natal and Cape Prov. Probably breeding on Falconi- and Cuculiformes; with stray records from Galli-, Strigi- and Apodiformes. Analysis of available data follows. Falconiformes: Accipitridae 5 records (Accipiter 2, Lophaetus 1, Pernis 1, genus indet. 1); Falconidae (Falco) 1; Cuculiformes: Musophagidae 11 (Corythaeca 5, Musophaga 4, Tauraco 2); Galliformes: Phasianidae
Systematics. Zumpti is the only Ethiopian representative of the group. Its affinity to the Neotropical form *plumanni* is significantly stronger than to the Oriental ones. The median ocellus is always larger and more prominent than lateral ones. In 1♀ from Kampala ex *Corythaeola*, the right lateral ocellus is entirely undefinable, and in 2♀ from Masaka ex *Musophaga* both lateral ocelli are absent. The cell *2m* is usually entirely setulose in both sexes (fig. 9 in original description represents the wing of a rubbed specimen). The apical corner of cell *2a* always has some setulae. The most distinctive character of *zumpti* is that the tergite 6 is strongly constricted medially. The palpus, head in profile, prosternum, fore tarsus and wing are as in fig. 5, 6, 7, 10 and 39, respectively.

*Icosta (Ornithoponus) maquilingensis* (Ferris) Fig. 4, 6, 7, 23, 40, 41.

*Ornithophila maquilingensis* Ferr., 1924a: 392, fig. 1-2, ♀. Type: ♀ (UCB), ex (?) bird, Mindanao (♀) and Taiwan (♂), ♀ abdomen (40) and ♂ genitalia (41).

**Material.** 51 ♂♂, 51 ♀♀.

**BURMA:** 5♂♂, 7♀♀, 2 puparia (MCZ), in 9 lots, partly reared, (1 ♀ w. mite on abd.), Myitkyina, ex *Gallus gallus*, X.1944-V.1945; 1♂ (MCZ), id., *Centropus sinensis*, IV.1945.


**LAOS:** 1♂ (MCZ), Muong Yo.

**VIETNAM:** 1♂, "Vietnam", ex *G. gallus gallus*, R 70021, VI.1960, R. Leach. 1♂, Fyan, 900-1000 m, VII-VIII.1961, Spencer.


**PHILIPPINES:** 2♀♀ (CNHM), E slope, Mt McKinley, Davao Prov., 1100 m, Mindanao, ex *Prioniturus discorpus waterstradti* #841, IX.1946, Hoogstraal. 1♀ (UCB), Cotabato, Mindanao, ex *Hydrocorax [Buceros] mindanaensis*, coll. Rivera. 1♂ (MCZ), Palawan.

**BORNEO:** 1♂ (UCB), Mt Murud, ex *Haematotyrax sanguineiceps*.

**Habitats.** Indo-Chinese, Malaysian and Philippine Subregions, widespread, from sea level to 2100 m: at present known from Burma, Thailand, Laos, Vietnam, Taiwan, Java, Borneo and Philippines. Apparently breeding on Galliformes: Phasianidae, with stray records from Ciconi-, Grui-, Psittaci-, Cuculi-, Coracii- and Piciformes. Analysis of available data follows. Galliformes: Phasianidae 45 records (*Arborophila* 4, *Bambusicola* 19, *Gallus* 19, *Haematotyrax* 1, *Hierophasis* 2); Ciconiiformes: Ardeidae (*Gorsachius*) 2; Grui-formes: Rallidae (*Rallina*) 1; Psittaciformes: Psittacidae 2 (*Prioniturus* 1, *Psittacula* 1); Cuculiformes: Cuculidae (*Centropus*) 2; Coraciiformes: Bucerotidae (*Buceros*) 1; Piciformes: Capitonidae (*Megalaima*) 1. Highest densities per infested bird were 2♂♂, 8♀♀ ex *Gallus* (WS 830) in Thailand and 4 ♂♂, 3 ♀♀ ex *Hierophasis* (TMT 1832) in Taiwan. Among 13 *Excalfactoria*, 13 *Arborophila*, 53 *Bambusicola* and 10 *Hierophasis* examined in
the latter country, 0, 4, 19 and 2, respectively, were found infested with this fly. Average infestation rate of those 89 birds was 28%, and average number of flies per infested bird was 2 (Maa et al. 1965: 399).

Systematics. In size of body and relative length of palpus, maquilingensis and simplex are so similar that Bequaert (1953a: 318, 1955: 265) suggested them to be inseparable. Besides the characters given in the key, the former species can be distinguished from the latter in having body size slightly smaller, face not less, or hardly less, than 1/2 (19-20: 37) width of head, inner orbit broader, ocelli smaller, tarsal spines under ♀ foreleg 1.0.1.0 (not 2.1.1.0), ♀ laterites 2 and 3 extensively bare at ventral disc (not uniformly setose all over), ♀ tergite 6 slightly widened posteriorly (not anteriorly), lateral setae on ♀ abdomen more robust, ♀ urogenital area anteriorly fenced by 2-3 rows of black moderately long setae (not 1 row). The host preference of the 2 species is also different. The original description was based on a single unfed ♀ and, therefore, is not quite satisfactory regarding the abdominal chaetotaxy. The palpus, head in profile, prosternum, thorax, ♀ abdomen, and ♀ genitalia are as in fig. 4, 6, 7, 23, 40 and 41, respectively.

Icosta (Ornithoponus) simplex (Walker) Fig. 5-7, 20, 38, 42-44.

Ornithomyia simplex Wk., 1861: 263. Type: ♀ (BMNH) ex (?) bird, Celebes.


Habitats. Celebes (type locality) and New Guinea lowlands, apparently breeding on terrestrial birds. Analysis of available records: Columbiformes: Columbidae 5 records (Ducula 1, Goura 2, genera indet. 2); Galliformes: Megapodiidae 4 (Aepypodius 1, Megapodius 1, Talegalla 2); Cuculiformes: Cuculidae (Centropus) 1. The last record is probably a straggler. The highest density per infested bird was 1♂, 2♀♀ (BBM 22398, ex Talegalla).

Systematics. This species is so similar to australica and maquilingensis that Austen (1903: 263) and Bequaert (1953a: 257) wrongly recorded its occurrence in Queensland, and that the latter author (1953a: 318) suggested simplex as possibly inseparable from maquilingensis. Obviously, simplex stands intermediate of those 2 species and is closer to maquilingensis than to australica. Since first published, no fresh specimen referable to true simplex have ever been reported. The relative measurements given below (scale 1 micrometric unit = 0.04 mm) were taken from the type (♀) and its accompanying ♂ from Celebes (figures for ♂ in parentheses); width, head 44 (43) units, face 17 (16), mediovertex 9.5 (10), postvertex 24 (22); length along median line, head plus thorax 89 (84), head from anterior frontal margin to occipital margin 35 (33), eye 29 (28), frons plus lunula 8 (8), mediovertex 20 (17) postvertex 8 (9), palpus 21 (19), prescutum 26 (23), scutum 17 (16), scutellum 13 (12). The frons proper in the type is less than 1/2 as long as lunula and...
much narrower than its shortest distance to eye-margin, postvertex anteriorly subtruncated (in ♂, subangular), scutellum with weak median furrow, metapleurotergal callus with 2-3 stout spines and 13-18 strong setae similar in length, wing 5.7 mm long (in ♂, 5.0 mm). The palpus, head in profile, prosternum, head in front view, wing, ♀ tergite 6, ♀ abdomen and ♂ genitalia of topotypes are as in fig. 5, 6, 7, 20, 38, 42-44, respectively.

**Icosta (Ornithopus) australica** (Paramonov) Fig. 2, 6, 7, 10, 11, 37, 45.

*Ornithophila australica* Param., 1954: 291, “♂”. Type: ♀ (not ♂ as originally stated) (ANIC), ex (?) bird, Queensland.

**Material.** AUSTRALIA (Queensland): 1♀ (MCZ), w. mites under abd., Rocky Scrub, Mcllwraith Range, C. York, ex *Alectura lathami*, coll. Darlington. 1♀ (BMNH 50.95),
Port Mollé, on board H.M.S. "Rattlesnake", ex *Talegalla (Alectura) laithami*, coll. MacGillivray. These 2♀♂ form the bases of Queensland records of *simplex* by Austen (l. c.) and Bequaert (l. c.).

**Habitats.** At present known only from Queensland lowland ex Galliformes: Megapodiidae (*Alectura*), possibly not rare on ground birds in eastern coastal Australia.

**Systematics.** The original description of this species is rather brief and is composed almost entirely of comparative notes against Ferris' drawing (not actual specimen) of *maquilingensis*. Main points mentioned were: wing length greater, 8 vs 5 mm; mediovertex ("frontal stripe") relatively narrower, 2.5 vs 4× as wide as inner orbit ("orbital stripe"); anterior margin of mediovertex slightly convex, not very convex; bristles at antennal apex much longer; palpus about as long as mediovertex; no bristles [evidently broken off] on mesonotum, scutellum and hind part of mesosternum. The following re-description is based upon the type (pinned) very kindly sent on loan by Dr Paramonov.
9. Uniformly pale, wing yellowish brown, veins brownish. Occipital margin slightly concave at middle; vertical bristle pale, much shorter and finer than orbital bristle, only about as long and robust as ordinary setae on inner orbit; postvertex 1/3 as long as wide; ocelli very small, widely apart from one another. Relative length of head, face and eye 43:20:12; inner orbit less than 1/2 as wide as mediovertex, widest above midlength. From proper as long as lunula, hardly narrower than its distance to nearest eye-margin, broadly notched anteriorly at middle; frontal process (fig. 6) in dorsal view strongly tapering apicad, in lateral view sub-angular preapically and slightly surpassing level of vibrissal area. Palpus (fig. 2) longer (25:21:20) than eye and than width of face, in lateral view distinctly decurved. Gula lacking spines. Mesonotum 45×62; prescutum densely striate all over, its laterocentral setae pale and very short. Scutellum 13×27, shorter than scutum, posterior margin evenly curved; scutellar bristle pale, hardly distinguishable in length and robustness from neighboring soft setae although more erect and originating from larger puncture. Humeral bristle (?); notopleural bristle as short and fine as vertical bristle; mesopleural and postalar bristles long, black. Mesopleural concavity deep, narrow. Metapleurotergal callus with 2-3 black spines and some brown stiff setae. Prosternum (fig. 7) moderately large, 2X as wide as long, well sclerotized, with 1 pair of pale setae. Wing (fig. 37) 6.9 mm long, very narrowly bare along anal margin of cell 2a (not entirely setulose as described by Paramonov), elsewhere on wing surface including alula entirely setulose; vein rm much closer (32:67) to im than to apex of C and situated slightly apicad to level of apex of R1; bulla of M1+2 lying just at midlength of cell 2bc. Tarsus 1 and tibia 3 as in fig. 10 and 11, respectively. Tarsal spine formula 1.0.1.0/2.1.1.0/1.1.0.0; tarsomere 1 of hindleg hardly longer than 2+3+4, much longer than 5; tarsomere 2 as long as wide, practically symmetrical. Abdomen (strongly shriveled in type) (fig. 45) dorsally covered largely with pale soft setae; syntergite 1+2 (lateral parts) and tergite 6 with erect blackish setae; 2 (1+1) patches of long stout setae near tergite 3; median striolate area largely bare; tergite 3 very large, almost as wide as scutellum; tergite 6 with 4-5 pairs of bristles at posterolateral corners. Abdominal venter medially with short and laterally with long setae. ♂ unknown.

The accompanying figures are based upon the ♀ from Cape York. The most distinctive character of this species is the degeneration of vertical, notopleural and scutellar bristles. Mainly on the strength of this character, australica is here placed on the top of the group.

**Minor Group**

**Distribution.** Old World; 5 species: 3 in the Oriental and 1 each in Ethiopian and Australian Regions. Two of the species extend to southern Palaearctic Region.

**Host Relationships.** The Oriental species are mono- or pleoxenous on Passeriformes particularly Ploceidae; the Ethiopian one polyxenous on Passeriformes and Cuculidae; the Australian one probably on Passeriformes, too.

**Diagnosis.** Color pattern very pale, some or most of major bristles pale or shortened. Vibrissal area sharply angular and slightly produced. Prosternum large, transverse, almost as strongly sclerotized and almost lying on same plane as mesosternum, its anterior margin virtually in line with that of mesosternum. Cell 2bc only 1/3 as long as 1bc; wingsetulae fairly extensive, alula ventrally setulose. Tergite 3 absent in both sexes. Aedeagus in profile broad, basally strongly bulged; ♀ postgenital plate Y-shaped. Sexual dimorphism very weak.

**Affinities.** Closest to Simplex group, with some affinities to Plana, Albipennis and Hirsuta groups. Its similarities to the Plana group are chiefly with the shape of vibrissal
Icosta (Ornithoponus) species, Minor group, wings, magnifications varied.

Fig. 46-48. Icosta (Ornithoponus) species, Minor group, wings, magnifications varied.

area; to the Albipennis group, with the general shape of face and ♂ genitalia; while to the Hirsuta group, with general features including color pattern and body size (for similarities to the Simplex group, see discussion under the latter). The 5 species and subspecies included are so closely related to one another and the available material is so scanty that the classification scheme suggested below must be considered provisional and that their separation has to rely upon minor quantitative characters. More subspecies are expected to be discriminated.

Icosta (Ornithoponus) minor (Bigot) Fig. 4, 7, 16, 24, 47, 49, 145.
Olfersia minor Bigot, 1858: 376. Type: ♂ (París Mus.), ex (?) bird, Gabon.
Material. 10 ♂♂, 20 ♀ ♂.
Fig. 49. Icosta (Ornithoponus) minor Bigot, Gabon, ♀ abdomen.


UGANDA (all in MCZ): 1♀, Kampala, ex Oriolus monachus rolleti, IX.1934, Hopkins; 2♂♀, 1♂, ex, Centropus superciliosus; 1♂, id., Macronyx croceus; 1♂, 1♀, id., Lagonosticta senegala; 1♀, Kampala, ex Lanius e. exubitarius, V.1937, Chorley. 1♀, Entebbe, ex L. exubitarius, X.1933, Chorley. 1♂♀, Katwe, Toro, ex Centropus superciliosus luandae, coll. Hopkins. RUANDA: 1♀ (MCZ), Kaminiola, betw. Lake Kivu & Tanganyika, ex Pyromelana [Euplectes] orix leucnota, II.1927.

ETHIOPIA: 1♀ (BMNH), Fouri, IX.1914, Kovacs. SUDAN: 1♀ (BMNH), Wady Gabgaba, ex Passer domesticus.

CONGO: 1♂ (MCZ), Tshibati, Kivu, ex Cyanomitra alinda or Batis diops, “It flew on
to me", 1953, Chapin. 1♀ (MCZ), Kwamouth, VI.1920, Schouteden; 1♂ (MCZ), Kwamouth, ex *Vidua macroura*, XII.1926.

**SENEGAL**: 1♀ (MCZ), Dakar, Ifan, M'Bas, ex *Melittophagus pusillus*, 1947, Villiers.  
**MOROCCO**: 1♀ (MCZ), Sous, ex *Tchagra senegala cuculatus*, coll. Meinertzhagen. 2 ♀♀, (MCZ), Mogador, IX.1938, Meinertzhagen.  
**ITALY**: 1♀ (MLN ex coll. Bezzi), Belvedere, X.1890, Solari, det. Speiser as *Lynchia falcinelli* Rndn.  
**TURKEY**: 1♂ (MCZ), Kamer, Tatvan, Bitlis, Asia Minor, 1800 m, ex *Pica pica*, VII. 1954, Hoogstraal, det. Bequaert first as *falcinelli* Rndn. and later as n. sp.  

**Habitats.** Entire Ethiopian Region and Mediterranean Basin, so far known from Madagascar, Cape Prov., N. Rhodesia, Mozambique, Nyasaland, Tanganyika, Kenya, Uganda, Ruanda, Ethiopia, Sudan, Congo, Gabon, Senegal, Morocco, British Is., Italy, Asia Minor, and Israel. Obviously breeding on Passeriformes, with stray records from Cuculi- and Coraciiformes. Analysis of data listed above plus that in my earlier (1964) paper follows. Passeriformes: Ploceidae (Estrilda, Euplectes, Lagonosticta, Passer, Ploceus, Vidua) 7 records; Laniidae (*Lanius, Tchagra*) 5; Muscicapidae (*Batis, Bradypterus, Turdus, "finch") 4; Oriolidae (*Oriolus*) 1; Nectarinidae (*Cyanomitra*) 1; Motacillidae (*Anthus, Macronyx*) 2; Corvidae (*Pica*) 1; Cuculiformes: Cuculidae (*Centropus*) 4; Coraciiformes: Meropidae (*Melittophagus*) 1.  

**Systematics.** Since first published, nothing has been added besides redescriptions by Speiser (1902b: 156-57) and Theodor et al. (*l. c.*) and records and notes by Maa (*l. c.*). Tarsal sensillae and other details of the above-listed specimens were not counted and analysed and possibly there exist several geographical races. This species was recognized as new by Bequaert, and many of the specimens in Mus. Comp. Zool., Harvard were labeled as types of his manuscript name. The palpus, proternum, head, thorax, wing, ♀ abdomen and hind tarsus are as in fig. 4, 7, 16, 24, 47, 49 and 145, respectively.

**Icosta (Ornithoponus) sensilis sensilis** Maa, new species Fig. 5, 19, 27, 48, 51, 52, 146.  
**MATERIAL.** 10 ♀♀, 27 ♀♀. Holotype ♀ (BISHOP 7579), allotype ♀ and most paratypes (BISHOP); 3 and 5 paratypes (CNHM and MCZ, respectively); others to USNM, BMNH, ANIC.  

**E. PAKISTAN:** Paratype ♀ (MCZ), Sylhet, Baramchal, 50 m, ex *Lanius* #6017, IV.1958, Paynter.  

**BURMA:** Paratypes 1♀, 2 ♀♀ (MCZ), Myitkyina, ex *Centropus b. bengalensis*, IV-V. 1945, U.S. Typhus Lab.; 1♀, 3 ♀♀ (♀ w. mites on abd.), *id.*, *C. s. sinensis*, IV-V.1945.  


**MALAYA:** Paratypes, 1♀, Subang, Selangor, ex *Pygnonotus goiavier*, M 917, II.1962, McClure; 3♀♂, *id.*, *C. sinensis*, M 911; 1♀ (CNHM), Kuala Lumpur, Selangor, ex *C. ben-
Fig. 50-52. Icosta (Ornithoponus) sensilis sensilis Maa (♀, Malaya) and I. (O.) sensilis reducta Maa (♂, India). ♀ abdomen (50), ♂ postgenital plate (51), and ♂ genitalia (52).


PHILIPPINES: Paratypes, 1♀, Calatagan, Batangas, Luzon, ex Rhipidura javanica nigritorququis, H 156, IX.1964, M.A.P.S. 1♀, Dalton Pass, Nueva Vizcaya, Luzon, ex Brachypteryx montana, 6E 0156, XII.1965, M.A.P.S.; 3♀♂, w. mites, id. Centropus toulou, 6E 0169, 5E 2417, VIII-IX.1965. 1♀, Negros Oriental, Siaton, ex Megalurus palustris forbesi, BBM 6502, VIII.1964, Wilson. 1♂, Balisong, Mt Matutum, Tupi, Cotabato, Mindanao, ex Lanius schach nasutus, SU-BBM 1333, II.1964, Rabor. 1♀, Tambo, Marui, ex Centropus viridis,
Habitats. Probably widely spread over Oriental Region, at present known from E. Pakistan, Burma, Thailand, Malaya and Philippines, lowlands, up to 1000± m. Apparently breeding on Cuculi- and Passeriformes. Analysis of available data as below: Cuculidae (Centropus) 12 records, Pycnonotidae (Pycnonotus) 3, Muscicapidae (Acrocephalus, Brachypteryx, Megalurus, Rhipidura) 4, Motacillidae (Motacilla) 1, Laniidae (Lanius) 3, Ploceidae (Ploceus) 2; Hirundinidae (Hirundo) 1. Highest density per infested bird was 3 flies in Thailand (B 21007) and Malaya (M 911), both on Centropus.

Systematics. Both in structure and geographical range, sensilis stands intermediate of minor and lonchurae. It is so closely similar to minor in general features and in host preference that these two perhaps should be considered geographical races of 1 single species. Since the material at hand is too limited and since there is a wide gap between known distributional ranges of the 2 forms, they are here kept separate. In 1♀ from Malaya, the metapleurotergal calli each has 3 black curved setae.

♀. Differing from lonchurae in the following points. Head (fig. 19): Palpus as in fig. 5. Postvertex often slightly longer; gula posteriorly usually with pale soft setae, seldom partly with fine black ones. Thorax (fig. 27): Mesonotum 30×41; scutellum 9×22; metapleurotergal callus with only pale soft setae, very seldom with 1 or 2 black setae at right or left side. Wing (fig. 48) 3.6-4.2 mm long. Segment 1 of hind tarsus ventrally usually with 1-2 minor spines each near base and near outer apical corner; outer margin of segments 1-5 with 3-8, 1-3, 1-3, 4-9 sensillae, respectively. Abdomen (see fig. 50) more finely setose; ventral setae near spiracle 3 hardly more robust than on median area and hardly longer than width of their respective basal papillae; urogenital area on each side flanked by 10± much longer, slightly more robust setae.

♂. Segments 1-4 of hind tarsus (fig. 146) with fewer sensillae on outer margin than in ♀. Setae around spiracle 3 not more, or hardly more, robust than those around spiracles 4 and 5, and in average, hardly longer than width of their basal papillae; urogenital area flanked by setae much shorter than tergite 6. Aedeagus (fig. 52) and paramere as figured. Postgenital plate (fig. 51) with more numerous setae. Other characters similar to lonchurae.

Icosta (Ornithoponus) sensilis reducta Maa, new subspecies  Fig. 7, 50.


Habitats. Not quite clear; probably widely distributed in peninsular India on Passeriformes. Prof Theodor wrote me that he has an undescribed Afghan species closely related to minor. Perhaps it is referable to reducta.

Systematics. Differing from nominotypical sensilis only in more reduced sensillae and spines on tarsus 3 (see key). These differences are so slight that I hesitated a long time before giving this Indian form a name. Prosternum and ♀ abdomen as figured. Countings of the outer marginal sensillae of segments 1-5 in the only available specimens are 3.0.0.0.1, 2.0.0.0.2, 1.0.0.0.2 and 1.0.0.0.2, respectively. Countings of the same in typical sensilis as well as lonchurae are as follows.
### Table 3. Outer marginal sensilla of hind tarsomeres in *Icosta* showing variation ranges of geographical races.

<table>
<thead>
<tr>
<th>Race</th>
<th>Country</th>
<th>Tarsomere</th>
<th>No. ♀♂ examined</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>s. sensilis</em></td>
<td>Burma</td>
<td>I: 3-8</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Thailand</td>
<td>II: 5-7</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Malaya</td>
<td>III: 5-8</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Philippines</td>
<td>IV: 3-6</td>
<td>7</td>
</tr>
<tr>
<td><em>loungharae</em></td>
<td>Thailand</td>
<td>V: 0-3</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Malaya</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Philippines</td>
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<td>2</td>
</tr>
<tr>
<td></td>
<td>Taiwan</td>
<td></td>
<td>36</td>
</tr>
</tbody>
</table>

#### Icosta (Ornithoponus) *loungharae* Maa, new species

**Material.** 15♀♂, 41♀♀. Holotype ♀ (BISHOP 7581), allo- and 54 paratypes, latter in BISHOP, USNM, BMNH, ANIC, TARI.


THAILAND: 5♂♂, 6♀♀, Chiangmai, Ban Khilek, Amphoe Maetaeng, ex *L. punctulata*, SMRL 565, 568, 570, 571, 578, III.1962.

MALAYA: 1♀, "Malaya", ex *L. atricapilla*, H 980, II.1964, M.A.P.S.


**Habitats.** Indo-Chinese Subregion, at present known from NW Thailand and Taiwan, and spreading southward to Malaya and Philippines. Lowland. Obviously confined to *Lonchura* spp. (Passeriformes: Ploceidae). The highest density per infested bird was 2♂♂, 1♀ (SMRL 568) in Thailand. Among 22 *Lonchura* collected during the winter in Taiwan, 6 were found infested by this fly; the average infestation rate was 27% (Maa et al. 1965: 399, as *Lynchia* sp. "L").

**Systematics.** *Lonchurae* is slightly smaller in body size, and darker in setal color and has more restricted host and distributional ranges than *sensilis* and particularly *minor*. It is apparently a rather recent offshoot from the ancestral stock of this group.

♀. **Color** very pale, dorsally yellowish brown, ventrally whitish; wing hardly tinted with...
brownish; veins C, Sc and R₁ practically colorless, other anterior veins yellowish brown. **Head**: (fig. 15): Occipital margin very weakly convex; vertical bristle pale, as long as notopleural bristle; postvertex 3.5-4× as wide as long, anteriorly truncate. Face very wide, hardly narrowed anteriorly. Frons proper scarcely shorter than lunula, its anterior notch narrow, subangular; frontal process (fig. 6) in dorsal view broad at base, strongly narrowed apicad, in profile broadly rounded off into vibrissal area; anterior and ventral margins of vibrissal area forming together an angle of ca 90°, ventral margin with pale setae. Palpus as in fig. 3. Gula posteriorly with both pale setae and black spines. **Thorax**: Mesonotum 26×35; notopleural bristle pale, all other major bristles black; prescutum unsculptured posteromedially, sparsely faintly striate posterolaterally, laterocentral setal patch largely composed of very short pale soft setae, mixed with 4-5 bristles which are also pale and hardly surpass transverse mesonotal suture. Scutellum 7×18, posterior margin evenly convexly curved. Metapleurotergal callus with 2-3 black stout spines and a few pale and black setae. Prosternum (fig. 7) slightly less sclerotized than neigh-
boring sclerites, $3 \times$ as wide as long, truncate anteriorly, bearing 2-3 pairs of soft setae. **Wing:** (fig. 46) 3.5-3.8 mm long; setulae covering all cells except $2m+1a$ (posterior 2/5) and 2a. **Legs:** Femur 1 as in fig. 9. Tarsal spines 1.0.0.0/2.1.1.0/2(3).2.1.1; tarsomere 3 of foreleg with outer apical lobe scarcely longer than inner; tarsomere 1 of hindleg as long as 2+3, shorter than 5; its 2 outer apical spines much weaker than 2 inner ones; outer margin of tarsomeres 2-4 of same leg usually lacking sensillae (Table 3). **Abdomen** (fig. 53) finely setose; dorsal striolate area with scattered small setae; ventral setae on median area finer and usually paler than on lateral area; urogenital are flanked on each side by 20+ much more robust setae. Syntergite 1+2 anterolaterally with pale soft setae, posterolaterally with black spines; tergite 6 large, posterior margin straight, with 6-8 pairs of bristles. Laterites 3 and 7 and prepogonite plate all undefinable; postgenital plate with 3-4 minute setae.

♂. Similar. Tarsus 3 as in fig. 144. Setae around abdominal spiracle 3 distinctly more robust than those around spiracles 4 and 5, and largely more than $2 \times$ as long as width of their respective basal papillae; urogenital area flanked by setae nearly as long as tergite 6. Aedeagus (fig. 54) rather robust and apically straight; paramere also robust, apically distinctly decurved. Postgonal plate apically deeply cleft at middle, with only 3-5 setae on each lobe.

**Icosta** (*Ornithoponus*) sp. “W”

AUSTRALIA: 1 pinned ♀ (ANIC), nr Penrith, N.S. Wales, no host record, X.1949, Hindwood.

♂. Occipital margin virtually straight; vertical bristle black, much shorter than notopleural bristle, only $2 \times$ as long as postvertex; postvertex $1/4$ as long as wide, anteriorly truncate. Relative width of head, eye, face and postvertex $49 : 10 : 26 : 31$; inner orbit $ca$ $1/2$ as wide as mediovertex; orbital setae all pale; upper orbital bristle also pale, lower one black and $1/4$ longer than vertical bristle. Frons proper distinctly shorter than lunula, with rather broad anterior notch. Palpus shorter (23 : 27) than eye. Gula posteriorly with pale fine setae as well as black stiff ones which are subequal in length to one another. Mesonotum $44 \times 62$; major bristles all long and shining black; laterocentral setal patch of prescutum including 7-8 black bristles which are hardly shorter and paler than other major bristles and which distinctly surpass level of transverse mesonotal suture. Scutellum $13 \times 32$. Metapleurotergal callus with 2-3 black stiff setae and some paler finer ones. Prosternum well sclerotized. Wing 3.1 mm long; vein $rm$ situated distinctly distad to level of $R_7$ apex and $2 \times$ closer to $im$ to $C$- apex; bulla of $M_{1+2}$ situated slightly distad to midlength of cell 2bc. Tarsal spines 1.0.0.0/1.1.0/?. Hindleg (?). Syntergite 1+2 with black ordinary setae at anterolaterally area; chaetotaxy of abdominal membrane (?); genitalia (?). Other characters similar to *lonchurae* as described.

Fig. 55-57. **Icosta** (*Ornithoponus*) species, Parallelifrons group, wings, magnifications varied.
**Parallelifrons Group**

*Distribution.* Confined to the Oriental (2 species) and Australian (1 species) Regions.

*Host Relationships.* Monoxenous; on Psittacidae (*Cacatua*).

*Diagnosis.* Face moderately wide; palpus only ca 2X as long as wide. Lateroventral bristles of prescutum always present; major thoracic bristles often shortened and discoloured. Wing practically clear hyaline, anterior veins yellowish, setulae not extensive. Abdomen largely or almost entirely covered with pale short setae, with conspicuous patches of strong bristles on dorsum; tergite 3 always present, ♀ laterite 7 almost always absent, ♀ pregenital plate always absent. Aedeagus short, bulged at base. Sexual dimorphism weak.

*Affinities.* In the color pattern, this group simulates the Simplex and Minor groups, whereas in shape of palpus and aedeagus, it approaches the Albipennis group. The ♀ postgenital plate is simple, not Y-shaped as in the Minor and Albipennis groups. By summation of general features, the Parallelifrons group may be considered a connectant between the subgenera *Ornithoponus* and *Ardmoeca*. The 3 species included are very closely related to one another.

*Icosta (Ornithoponus) parallelifrons* (Speiser) Fig. 4, 7, 18, 26, 56, 58, 59.

*Olfersia parallelifrons* Speiser, 1902b: 336. Type destroyed, ex (?) bird, NW New Guinea; neotype ♂ (BISHOP 7582), here designated, in Bishop Mus., ex *Cacatua galerita triton*, Sepik Distr., NE New Guinea.


AUSTRALIA: 1♂ (ANIC), Grafton, N. S. Wales, ex *C. galerita*.

**Habits**. New Guinea and eastern Australia, lowland, up to 900 m, apparently confined to Psittaciformes: Psittacidae, particularly preferring *Cacatua (Cacatua) galerita*. Highest density per infested bird was 3♂♂, 6♀♀ (BBM 29336 ex cockatoo), average 2.2 flies.

**Systematics.** This species is known so far from the original description. The unique type has never been re-examined by later authors and was recently destroyed. There is a single New Guinea specimen in the Mus. Comp. Zool. Harvard labeled by Bequaert as *parallelifrons* but apparently referable elsewhere (see under *jactatrix* n. sp.). Due to lack of any topotypes fitting the description, it was not placed by me (1963: 119) in any subgeneric group.

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Fig. 58-59. *Icosta (Ornithoponus) parallelifrons* Speiser.: 58, ♀, abdomen; 59, ♂ abdomen including genitalia.
The original description reads “Die Art steht der *O. papuana* Rnd. [=plana Wk.], deren Original-Exemplar ich vergleichen konnte, ausserordentlich nahe, lässt sich aber sicher dadurch unterscheiden, dass die Stirn an sich breiter ist als bei *O. papuana* Rnd., und ferner vorne über den Antennen genau ebenso breit ist als am Scheitel, während bei *O. papuana* Rnd. die Augenränder nach vorn derart convergieren, dass die Stirn vorn beträchtlich, oder doch merklich schmaler ist als am Scheitel. Auch sind die Maxillarpalpen, welche die Rüsselscheide bilden, bei der neuen Art etwas kürzer und breiter. Länge des trocken aufbewahrten Exemplars 3 mm. gegen 3.5 bei Rondani’s Art. Die Länge Mundrand-Scutellar-Hinterrand ist aber bei beiden gleich, 2.5 mm und auch die Länge der Flügel bei beiden 4.5 mm. Dattelbraun mit dunklerer Stirn und helleren, dunkel ledergelben Beinen. Kopf rundlich, nur etwa 2/3 so breit, wie der Thorax. Die Innenränder der Augen verlaufen fast genau parallel, so dass die Stirn vorn über den Antennen ganz ebenso breit ist, wie hinten oben am Scheitel. Stirn matt, nur an den Rändern etwas glänzend. Antennenfortsätze klein, mit einem ziemlich kräftigen Büschel schwarzer Borsten, dunkelbraun. Die die Rüsselscheide bildenden Maxillarpalpen kurz, nicht ganz halb so lang als der Kopf, und breit, etwas halb so breit als lang, ebenfalls dattelbraun. Der Thorax bietet keinerlei Besonderheiten, ebenso wenig die Biene, welche ganz ledergelb sind, mit schwarzen Krallen. Auch über das, beim vorliegenden Exemplar stark zusammengetrocknete Abdomen ist nichts zu bemerken. Sehr interessant ist das Flügelgeäder, und fast möchte ich glauben, dass der hier vorliegende, von unserm europäischen Ofersien ganz abweichende Befund genügen würde, eine neue Gattung zu schaffen. Mindestens ist er zur Abgrenzung einer Artengruppe innerhalb der alten Gattung sehr brauchbar. Bei oberflächlicher Betrachtung hat man nämlich den Eindruck, als würde die Radialis nicht in die Costalis, sondern in der Cubitalis! Die Verhältnisse liegen aber tatsächlich anders. Jenseits der Einmündung der Subcostalis beginnt die bis dahin schmale Costalis sich beträchtlich zu erweitern, sie wird gewissermassen aufgeblasen ... Dass die Flügel selbst fast glashell und die gewöhnlichen Adern ledergelb, wie die Beine sind. Ihre Anordnung ist sonst die gewöhnliche, wie sie *O. papuana* Rnd. und der Mehrzahl der anden Arten zukommt. Die Krallen sind regelrecht doppelt gezahnt, d.h. sie haben je einen accessorischen Zahn zwischen Basalhöcker und eigentlichen Krallenhaken.”

Specimens here referred to *parallelifrons* match the original description in every detail and leave no doubts about their identity. The venation as shown in fig. 56 is not so outstanding as strongly emphasized by Speiser. In fact, the thickening of C after meeting R₃ and the seemingly direct joining of R₂+₃ and R₄+₅ at their apices is a feature common to many *Icosta* species. The close affinities of *parallelifrons* to *plana* (=papuana) as presumed by Speiser are merely superficial similarities in size, color pattern and several features of head and thorax. Among the *Icosta* species of New Guinea, *parallelifrons* can immediately be recognized by its nearly clear hyaline wings, and secondarily by the short palpus and broad face. It can easily be distinguished from *plana* by these characters as well as the broadly rounded vibrissal area. The nearly parallelsided face is not so distinctive as believed by Speiser.

This species is closely related to both *papulata* and *paramonovi* but has much darker and stronger abdominal setae.

♀. *Color* very pale, dorsally pale brownish, ventrally whitish; in pinned specimens, mesonotum brown, darker than face, humeral callus and scutellum which are entirely or largely yellow; wing almost colorless, anterior veins yellowish. *Head*: (fig. 18) Occipital margin straight; vertical bristle pale, as long as notopleural bristle; postvertex very short. Face very wide, nearly parallel-sided; orbital setae uniseriate. Frons proper short, narrowly rounded notched at middle, frontal process in dorsal aspect fairly broad, weakly tapering apicad, in profile very broadly rounded-off. Palpus (fig. 4) 1/2 as long as eye. Gula posteriorly with pale setae. *Thorax*: (fig. 26) Mesonotum 38×53; humeral (and often postalar and scutellar) bristle pale,
notopleural and mesopleural ones black; prescutum sparsely, very feebly striate all over, latero-central setal patch composed of both short and long setae, long ones 3-5 in number, more than 2× as long as short ones, not reaching transverse mesonotal suture. Scutellum 10.5×25, its posterior margin evenly convex. Metapleurotergal callus with 4-6 black stout spines. Prosternum (fig. 7) large, transverse, moderately sclerotized, with 4-5 pairs of short soft setae. Wing (fig. 56) 4.7-5.2 mm long; setulae not extensive, Jr and Jm setulose except basal corners, 2m+Ja with fairly large antero-apical setulose patch, other cells entirely bare. Anterior surface of femur 1 with fine sparse setae all over, with 2-3 black strong erect ones near midlength. Tarsal spines 1.1.1.0/2.1.1.0/10-11.2.1.1; tarsomere 1 of midleg ventrally with 4-5 short, unusually stout setae besides above mentioned spines; tarsomere 1 of hindleg 19×6, slightly longer than 2+3+4, distinctly longer than 5, tarsomere 2 as long as wide; 3 and 4 weakly asymmetrical. Abdomen (fig. 58) with dorsal setae stouter than ventral ones; dorsal striolate area hardly setose, occasionally with 1-2 unusually long stout setae posterolaterad to tergite 3; ventral setae near lateral margin distinctly more robust and usually darker than on median and submedian areas; urogenital area anteriorly fenced by few black erect robust setae and a number of ordinary pale

Fig. 60. Icosta (Ornithoponus) paramonovi Maa, ♂ abdomen including genitalia.
recumbent fine ones; lateral area of abdominal apex produced lobe-like and bearing numerous stiff bristles which are much longer than on tergite 6. Setae on lateral part of syntergite 1+2 slightly shorter than those near spiracles 4 and 5; tergite 6 moderately large, anteriorly bare, posteriorly not notched, or only slightly so at middle, and with 3-4 pairs of unusually short bristles. Laterite 2 with setae not more robust than near spiracles 4 and 5; laterite 3 in matured specimens dorsally undefinable, evenly setose, ventrally well sclerotized, unusually large, wider than long, largely bare, with few short fine setae near inner and outer margins; laterite 7 undefinable. Postgenital plate bare; infra-anal plate apically deeply incised at middle, apical 1/3 with some fine setae, remaining area bare except 3-4 short erect setae along oblique ridge between plate proper and its basal flap.

♂. Similar. Basal 1/2 of cell lm bare. Tarsus 1 with 1.0.0.0 spines. Syntergite 1+2 laterally with long setae; tergite 3 small; tergite 6 rather small, posteriorly broadly, deeply notched at middle and with long bristles. Laterite 2 spinose; laterite 3 hardly definable, its venter evenly setose, with some spines near anterior margin. Dorsal abdominal membrane (fig. 59) with a patch of 30-40 long dense stout bristles on each side, lateral area of abdominal apex not lobe-like but with setae much longer and more robust than elsewhere. Aedeagus moderately long, slender and apically straight; paramere also slender and apically straight, narrowly rounded at extreme apex. Postgenital plate simple, apically with fine pale setae mixed with few short

Fig. 61. Icosta (Ornithoponus) papulata Maa, ♀ abdomen.
Icosta (Ornithoponus) paramonovi Maa, new species

**Material.** 2♂, 2♀. Holotype ♀ (ANIC), allotype ♂ (BISHOP), paratypes (ANIC).

AUSTRALIA: Holotype ♀, “S. Australia”, ex Cacatua r. roseicapilla, XI.1928. Allotype ♂, 3 km N of Wilpena Pound, N. Flinders Range, S. Australia, ex C. r. roseicapilla, XI. 1951, Brown. Paratypes 1♂, 1♀ (ANIC), nr Deniliquin, N. S. Wales, ex C. r. roseicapilla, VIII.1950, Spence. Besides the type series, I briefly examined years ago several S. Australian specimens received from Queen Victoria Museum, Launceston. They are believed to be referable here but no direct comparison with the type series was made then.

**Habitats.** Confined to Australia and obviously to Psittaciformes: Psittacidae. At present known from N. S. Wales and S. Australia ex Cacatua (Eolophus) roseicapilla Vieillot. Both the subgenus and species of this bird are endemic to Australia.

**Systematics.** More closely related to papulata of the Lesser Sunda Is. than to parallelifrons of New Guinea-Australia. This is perhaps due to the existence of an early faunal bridge between the Sundaland and Australia via Timor and Key Is. As shown in the key, couplets 10-11, chief differences of the 3 species are the color, relative length, density and robustness of setae-bristles on legs and abdomen. Named in honor of the late Dr S. J. Paramonov.

♀. Very similar to parallelifrons, differing in following characters. Occipital margin hardly convex. Orbital, vertical and all major thoracic bristles pale, in contrast with black bristles at antennal apex. Prosternum as in fig. 7. Wing (fig. 57) 4.5 mm long; cell 2r setulose at apical 1/2, 1r and 1bc with few setulae near apex, setulose stripe of 2m+1a narrower. Abdominal membrane on each side with group of 3 or 4 very strong bristles anteriorly to tergite 6; lateral area of abdominal apex not produced lobe-like, bearing only 2 or 3 stiff bristles which are shorter than on tergite 6. Tergite 3 small; bristles on tergite 6 of normal length, i.e. ca 2X as long as tergite itself. Laterite 2 with pale fine setae and scattered short black spines. Laterite 3 well defined both dorsally and ventrally, its dorsum longer than wide, with 2 or 3 short black spines and good number of pale soft setae, venter nearly as long as wide, with pale soft setae on outer margin, elsewhere with short black spines.

♂. Similar. Abdomen as in fig. 60. Lateral setae on syntergite 1+2 about as long as near spiracles 4 and 5; tergite 3 slightly larger than in ♀; tergite 6 shorter than in ♀, posteriorly straight, with 5-6 pairs of long bristles. Laterite 2 with pale soft setae; laterite 3 ventrally smaller and bearing fewer spines than in ♀. Lateral area of dorsal abdominal membrane uniformly covered with short sparse setae, posteriorly with 6-7 moderately strong bristles near each side of dorsal striolate area; ventral membrane entirely covered with pale fine setae.

Icosta (Ornithoponus) papulata Maa, new species


**Habitats.** At present known only from Komodo, a small islet between Sumbawa and Flores in the Lesser Sunda Is.; host bird undetermined, possibly Cacatua (Cacatua) sulphurea Gmelin, a close relative of C. (C.) galerita Latham.

**Systematics.** Very closely allied to parallelifrons of New Guinea-Australia and particularly to paramonovi of Australia. As suggested by its name (papula, a pimple, a pustule), this new species is chiefly characterized by large prominent papillae giving rise to pale short setae on black spines.
abdominal membrane. The 2 groups of black strong bristles lying before tergite 6 are similar to those in *paramonovi*.

♀. Color very pale, almost entirely yellowish white, darkest on occiput immediately above foramen, anterior margin of prescutum, posterior rims of thoracic spiracles, claws and abdominal syntergite 1+2; thorax with 1 pair of brownish stripes each between humeral calli, mesal to notopleural bristles and below humeral calli. Wing practically colorless, very thin, anterior veins very weakly tinted yellowish. *Head* (fig. 17) and *thorax* (fig. 25) similar to *parallelifrons*, palpus and frontal process as in fig. 4 and 7 respectively, occipital margin very weakly convex, all major bristles pale, mesonotum 35×47, scutellum 11×23, laterocentral bristles of prescutum more than 4× as long as laterocentral setae and reaching transverse mesonotal suture, metapleurotergal callus with pale spines, wing (fig. 55) 4.6 mm long, anterior surface of femur 1 with 3-4 pale spines near midlength (in contrast to black bristles on dorsal surface), tarsal spines 1.1.0.0/2.1.0.0/13(8+5).2.1.1. *Abdomen* (fig. 61) with pale very fine short setae covering entire

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**Fig. 62.** *Icosta (Icosta)* species (*acromialis* to *humilis*, arranged alphabetically), heads, front view, magnifications varied.
membranous area, basal papillae of such setae at lateral areas exceptionally large, giving the surface fairly roughened appearance; 1 pair of patches of 3-4 black strong bristles lying shortly before tergite 6. Syntergite 1+2 entirely covered with short pale setae; dorsal striolate area virtually bare; tergite 6 with longer stronger pale setae plus 7± pairs of long black bristles, its posterior margin distinctly notched at middle. Laterite 3 pale, though well definable, dorsum covered with pale short setae similar to those on syntergite 1+2, venter with shorter stronger setae; laterite 7 roundish, vestigial, exceedingly small, bearing 1 black bristle and 3-4 pale setae of varied length. Urogenital area anteriorly fenced with 6 erect setae which are hardly longer and stronger than recumbent setae on disc of abdominal venter, each side flanked by 3 strong black bristles including the one on laterite 7. ♂ unknown.

Subgenus Icosta, s. str.

Type-species. Olfersia dioxyrhina Speis.

Distribution. Palaeotropical; 23 species and subspecies: 18 in Oriental and 5 in Ethiopian Region; mostly rather localized.

Fig. 63, Icosta (Icosta) species (jactatrix to wenzeli, arranged alphabetically), heads, front view, magnifications varied.
Host Relationships. One species polyxenous, all remaining ones mono- or oligoxenous. Preferred hosts are Falconi-, Psittaci-, Galli-, Cuculi-, Coraci-, Pici- and Passeriformes.

Diagnosis. Frontal and vibrissal processes strongly produced and separated from each other by a distinct notch or incision; when occasionally not so, then tarsomeres 3 and 4 of foreleg distinctly asymmetrical, or metasternal process well developed, or frontal process in dorsal view strongly narrowed apicad and with inner margin distinctly curved in S-shape. Palpus never very short. Aedeagus slender, usually long. Sexual dimorphism weak to strong.

Affinities. This subgenus can usually be recognized by the tooth-like frontal and vibrissal processes which are also found in the genus Pseudolynchia. Following the inclusion of 4 anomalous species (wenzeli in Oriental, and recessa, subdentata, and humilis in Ethiopian Region), the subgenus has to be defined upon certain alternative or conditional characters. The asymmetrical fore tarsus is unique for all hippoboscids and the well developed metasternal process is found only in the genera Stilbometopa and Pseudolynchia rather than in other subgenera of Icosta itself. But those 2 characters are again not universal for the entire subgenus although in some species, they are linked with the well developed frontal and vibrissal processes. The subgenus is here placed next to Ornithoponus with which it has probably been primary branching-outs from the common ancestor of Icosta. Its similarities to Stilbometopa and Pseudolynchia mentioned above very likely represent secondary convergence. The subgenus is here rather arbitrarily divided into 2 groups, 7 subgroups. The separation of the different groups and species is not always easy and the following key is admittedly artificial.

KEY TO SPECIES AND SUBSPECIES OF ICOSTA (ICOSTA)

1. Vein R2+3 normal, evenly or nearly evenly narrow; its combined width with C, after merging together, not or hardly wider than apical section of R1+5; when wing has bare stripe along anal margin, then vibrissal area in profile toothlike, strongly projecting ................................................................. 2

Vein R2+3 (fig. 69) abnormal, its apical 1/2 suddenly widened and coalescent with C, their combined width, after coalescence, nearly 2× as wide as apical section of R1+5; wing with fairly broad bare stripe along anal margin; vibrissal area in profile broadly rounded, not projecting. W. & E. Africa......................... coalescens

2 (1). Frontal process (fig. 6, humilis, recessa, subdentata, wenzeli) in profile broadly rounded, not projecting, not clearly separated from vibrissal area except in color and in degree of sclerotization; vibrissal area also broadly rounded, at most subdentate and hardly projecting ................................................................. 3

Frontal process (fig. 6, dioxyrhina etc.) in profile sharply projecting, toothlike, clearly separated from vibrissal area by deep sharp notch; vibrissal area also toothlike and distinctly projecting ................................................................. 6

3 (2). Cell 2m+1a (fig. 80, 135) bare at posterior 1/3; 2a entirely bare; 2b+c ea 1/2 to 2/5 as long as 1bc ................................................................. 5

Cell 2m+1a (fig. 75, 82) uniformly setulose, at most with very small bare area near base, 2a with tiny patch of setulae at its anteroapical corner; 2b+c only 1/3 as long as 1bc ................................................................. 4

4 (3). Vibrissal area (fig. 6) broadly rounded; metasternal process ea 2× as wide at base as long, narrowly rounded at apex; frontal process (fig. 62) in dorsal view 1/2 as long as palpus; occipital margin weakly concave at middle. W. Africa......................... humilis
Fig. 64. Icosta (Icosta) species (arranged alphabetically), thoraces, dorsal view, magnifications varied; also for fenestella and trita, lateral view in part showing absence of spines on mesepimerum in latter species.

Vibrissal area (fig. 6) sharply angular, slightly projecting; metasternal process almost as wide at base as long, pointed at apex; frontal process (fig. 63) in dorsal view ca 1/3 as long as palpus; occipital margin straight at middle. E. Africa subdentata

5 (3). Vibrissal area (fig. 6) broadly rounded; segments 3 and 4 of tarsus 1 (fig. 10) distinctly asymmetrical, their outer apical lobes distinctly longer than corresponding inner lobes; frontal process (fig. 63) in dorsal view gradually narrowed apicad and with practically straight inner margin. Philippines wenzeli

Vibrissal area (fig. 6) angular; segments 3 and 4 of tarsus 1 symmetrical, not as above; frontal process (as in fig. 62, elbeli) in dorsal view unusually broad, suddenly narrowed apicad from about midlength, its inner margin curved in S-shape. E. Africa recessa

6 (2). Wing (fig. 77) 8.5-9.5 mm long, entirely covered with setulae except posterior 3/4 to 2/3 of cell 2a where it is bare; palpus (fig. 3, 63) much longer than mediovertex. E. Pakistan to Philippines longipalpis

Wing not more than 7.5 mm long, setulae not so extensive, cell 2a at most with few setulae at antero-apical corner, never forming complete stripe along vein 2A; cell 2m+1a often bare at posterior 1/2 to 1/3; palpus almost always distinctly shorter than mediovertex 7

7 (6). Scutellum normal, with evenly curved posterior margin; frontal process in dorsal
Fig. 65-68. *Icosta* (*Icosta*) species, *acromialis* to *chalcolampra*, wings, magnifications varied.

View also normal, gradually narrowed apicad, with practically straight inner margin. 

Scutellum (fig. 64, *elbeli*) unusually short, posteriorly subtruncate; frontal process (fig. 62, *elbeli*) in dorsal view unusually broad, suddenly narrowed apicad from about middle length, its inner margin curved in S-shape.
Fig. 69-72. Icosta (Icosta) species, coalescens to dioxyrhina, wings, magnifications varied.

8 (7). Wing (fig. 73) 6.2-6.6 mm long, setulose area of cell 2m+1a in ♀ triangular, much longer than wide, with 1 side of that triangle lying along apical 3/4 of abscissa 2 of vein M3+4; scutellar bristle (fig. 64) markedly finer and often paler than vertical and other major bristles; ♀ abdominal dorsum with lateral setae much more robust than sublateral setae. Assam to Philippines..........................elbeli

Wing (fig. 76) 4.6-5.1 mm long, setulose area of cell 2m+1a in ♀ transverse, lying on apical rather than anterior margin of that cell; scutellar bristle not noticeably finer
than vertical and other major bristles, always black; ♂ abdominal dorsum with lateral and sublateral setae nearly equal in fineness. New Guinea .......... jactatrix

9 (7). Setulose area of wing posteriorly reaching or even surpassing vein 2A; abdominal dorsum never with conspicuous patch of bristles on membrane .................... 10
Setulose area of wing posteriorly far from reaching vein 2A; abdominal dorsum often with conspicuous bristle-patches on membrane .......................... 12
Fig 77-80. *Icosta (Icosta)* species, *longipalpis* to *recessa*, wings, magnifications varied.

10 (9). Wing lacking bare stripe along anal margin; metasternal process ca 1/2 as wide at base as long, narrowly rounded at apex; ♂ tibia 2 lacking preapical spines. .......... 11

Cell 3r (in part), 1m and 2m+1a (fig. 72) with fairly broad bare stripe along anal margin of wing; metasternal process 2× as wide at base as long, pointed at apex; ♂ tibia 2 ventrally with series of preapical spines. Papuan Subregion .......... *dioxyrhina*

11 (10). Female abdominal dorsum with 3-4 outstandingly long and robust setae mesad to each of spiracles, 3, 4 and 5; setae covering ♂ laterite 2 not longer (or hardly so)
Fig. 81-84. *Teosta* (*Teosta*) species, *spinosa* to *trita*, wings, magnifications varied.

and stouter than those near spiracles 4 and 5; tarsomere 1 of ♂ midleg with single apical spine. Philippines

*Teosta* (*Teosta*) species, *spinosa* to *trita*, wings, magnifications varied. Female abdominal dorsum (fig. 107) lacking such setae, at most occasionally with 1-2 outstandingly long but not noticeably more robust setae mesad to spiracle 3 (not 4 and 5 as well); ♂ laterite 2 covered by spines (not ordinary setae) which are markedly longer and stouter than setae near spiracles 4 and 5; tarsomere 1
of ♂ midleg with 2 apical spines. Papuan Subregion ...................... a. acromialis

12 (9). Metasternal process about as wide at base as long or even longer than wide, acute or subacute at apex; segments 3 and 4 of tarsus 1 symmetrical; wing often with bare stripe along anal margin .................................................. 19

Metasternal process undefinable, at most represented by slight wavering (never acute or subacute) of posterolateral margin of metasternum; segments 3 and 4 of tarsus 1 more or less asymmetrical, their outer apical lobes more or less longer than corresponding inner lobes; wing never with bare stripe along anal margin .................. 13

13 (12). Setulose area of cell 2m+la (fig. 68, 83, etc.) stretching along full length of abscissa 2 of vein M3+4; cell lm either entirely setulose or at most with tiny bare patch or stripe at base .................................................. 15

Setulose area of cell 2m+la (fig. 71, 140) confined to apical corners or apical margin of that cell; lm either extensively bare at basal 1/2 or with 2-3 setulose stripes at apical part ............................................. 14

14 (13). Postvertex (fig. 62) trapezoidal, ca 1/2 as long as mediovertex; setulose area of cell lm (fig. 71) divided into 2-3 stripes; dorsal striolate area of abdomen (fig. 100) practically bare. New Guinea diluta

Postvertex subtriangular, slightly shorter than mediovertex; setulose area of lm (fig. 140) undivided; dorsal striolate area with scattered setae. Samoan Is. samouna

15 (13). Basal 1/2 of anterior (inner) surface of femur 1 (fig. 8) fairly setulose; tarsus 1 (fig. 10) strongly asymmetrical; ♂ laterite 7 entirely undefinable, urogenital area anteriorly fenced by outstandingly long robust setae; ♂ laterite 3 with small patch of spine-like setae about as robust as those on lateral area of syntergite 1+2. Oriental Region, widespread .................................. chalcolmpra

Basal 1/2 of anterior surface of femur 1 (fig. 8, fenestella) largely bare, with only few rows of setae along transmedian line and lower margin; tarsus 1 weakly asymmetrical; ♂ laterite 7 clearly definable, urogenital area not as above, anteriorly fenced by ordinary setae; setae on ♂ laterite 3 distinctly finer than those on lateral area of syntergite 1+2 ............................................. 16

16 (15). Wing 5.7-5.9 mm long; setae on basal 1/2 of anterior surface of femur 1 largely fine, subrecumbent (particularly those of lowest row), only those near extreme base short, robust, erect and somewhat similar to discal spines on coxa 1; pro sternum (fig. 7) well developed, almost equally sclerotized as mesosternum and bearing 3-5 pairs of black setae. N. Thailand .................................. tarsata

Wing less than 5 mm long; setae on basal 1/2 of anterior surface of femur 1 largely or entirely spine-like, those arranged along transmedian line distinctly shorter and heavier than those near extreme base; pro sternum not definable, or hardly so, never similarly sclerotized as mesosternum and never with black setae .............. 17

17 (16). Setulose area of cell 2m+la long, broad, extending along full length of apical abscissa of vein M3+4; mesepimerum with 3-5 very heavy spines besides ordinary setae; face and thoracic dorsum in fully matured specimens yellowish or reddish brown, lacking metallic lustre; ♂ syntergite 1+2 posterolaterally with 3 or more pairs of heavy spines; ♂ urogenital area anteriorly fenced by pair of patches of fine pale setae ............................................. 18

Setulose area of cell 2m+la (fig. 84) triangular, confined to antero-apical corner of that cell; mesepimerum (fig. 64) at most with 1 spine, usually only fine setae; face and thoracic dorsum in fully matured specimens black with strong metallic lustre; ♂ syntergite 1+2 lacking heavy spines; ♂ urogenital area anteriorly fenced by single row of black setae. Burma to Taiwan .................................. trita

18 (17). Femur 1 (fig. 9) strongly swollen, widest at a point of ca basal 1/3, its anterodorsal edge generally with 5 bristles; frons proper with width only 1/2 its shortest
distance to eye-margin; frontal process (fig. 6) in profile distinctly longer, broader
than vibrissal process; humeral callus in fully matured specimens not or hardly
paler than mesonotum. New Guinea............................................. plana
Femur 1 (fig. 8) moderately swollen, widest very near midlength, its anterodorsal
edge generally lined with 4 bristles; frons proper with width 4/5 its shortest
distance to eye-margin; frontal process (fig. 6) in profile slightly longer, distinct­
ly narrower than vibrissal process; humeral callus in fully matured specimens
distinctly paler than mesonotum. Burma to Taiwan and Philippines .......... fenestella
19 (12). Oriental species; frontal process in dorsal view not longer, usually much shorter
than palpus; hind basitarsus ventrally with not more than 4 spines; aedeagus not
as described below................................................................. 20
Ethiopian species; frontal process in dorsal view markedly longer than palpus;
hind basitarsus ventrally with 7-9 spines; aedeagus short and slightly decurved at
apex................................................................. meccorrhina

20 (19). Female abdominal dorsum (fig. 112) with only ordinary setae between tergite 3 and
spirecle 3; ♀ tibia 2 ventrally lacking preapical spines; wing-setulae in ♀ (fig.
66) practically covering entirety of cell lm and anterior 1/3 of 2m+1a, in ♂ cover­
ering anterobasal 1/2 of 1m and forming short narrow stripe near anterobasal
corner of 2m+1a. Philippines................................................... bicorna
Female abdominal dorsum (fig. 110, 114-115) with conspicuous patch of heavy bris­
tles between tergite 3 and spiracle 3; ♀ tibia 2 ventrally with series of preapical
spines; wing-setulae not as described above........................................... 21
21 (20). Palpus not longer, or hardly so than frontal process and much shorter than medio­
vertex; venter of ♀ laterite 3 either partly spinose or with setae distinctly longer,
stouter than dorsal setae near spiracle 3; wing-setulae not as below.................. 22
Palpus (fig. 62) 1/2 longer than frontal process and subequal to mediovertex in
length; venter of ♀ laterite 3 (fig. 115) with only ordinary setae similar in length
and robustness to dorsal setae near spiracle 3; wing-setulae (fig. 67) in ♀ cover­
ing only basal 3/4 of cell lm and forming narrow stripe in 2m+1a along basal
1/2 of vein M3r, in ♂ forming short narrow stripes along anterobasal margin of
both 1m and 2m+1a; aedeagus (fig. 116) decurved at apex. Thailand .......... bucerotina
22 (21). Venter of ♀ laterite 3 (fig. 114) with very heavy spines; spines between ♀ tergite
3 and spiracle 3 subequal in length to median part of tergite 6; ♀ cell 3r
posteriorly rather broadly bare, lm extensively bare, with narrow setulose stripes
along anterior and posterior margins and very small setulose patches on apical
margin; aedeagus (fig. 114) decurved at apex. Thailand, Laos ....................... spinosa
Venter of ♀ laterite 3 (fig. 110) with only ordinary stiff setae; spines between ♀
tergite 3 and spiracles 3 ca 2X as long as median part of tergite 6; ♀ cell 3r
posteriorly uniformly setulose, lm entirely setulose except along apical margin;
aedeagus (fig. 111) straight at apex. Ceylon, India to Thailand.................... corvina

Plana GROUP

Distribution. Palaeotropical; 11 species: 10 in Oriental and 1 in Ethiopian Region;
nearly all species are fairly localized in distribution.

Host Relationships. One species polyxenous (and widely distributed), 1 or 2 monoxen­
ous, remaining ones oligoxenous. Preferred hosts are Accipitridae, Psittacidae, Cuculidae,
Alcedinidae, Capitonidae and several passerine families.

Diagnosis. Tarsomeres 3 and 4 of each foreleg more or less asymmetrical; metasternal
process not or poorly developed; frontal process and scutellum sometimes abnormal in shape; aedeagus apically never hook-like. Sexual dimorphism fairly weak, only with abdominal chaetotaxy.

**Affinities.** Both in structure and in tendency of sexual dimorphism, this group shows closer affinities to the subgenus *Ornithoponus* than does the next group. Within the group itself, 3 subgroups may be recognized.

(a) Frontal process apically submembranous, broadly rounded in profile and separated from vibrissal area by very shallow angular notch; vibrissal area more or less projecting, either angular or produced into tooth-like process; mesonotum short, scutellum either normal or unusually short and posteriorly subtruncate; cell 2be of wing clearly less than 1/2 as long as 1bc; tarsus 1 weakly asymmetrical; ♀ laterite 7 present, urogenital area anteriorly not fenced by strong setae. On Psittacidae; 1 species: *wenzeli*.

(b) Frontal process in dorsal view unusually broad and with inner margin distinctly curved in S-shape, thus resulting in U-shaped frontal notch; vibrissal area more or less projecting, either angular or produced into tooth-like process; mesonotum short, scutellum either normal or unusually short and posteriorly subtruncate; cell 2be of wing clearly less than 1/2 as long as 1bc; tarsus 1 weakly asymmetrical; ♀ laterite 7 present, urogenital area anteriorly not fenced by strong setae; aedeagus relatively short. On Alcedinidae and Cuculidae; 3 species: *recessa, jactatrix, elbeli*.

(c) Frontal and vibrissal processes and scutellum all normal for the subgenus; cell 2be of wing clearly less than 1/2 as long as 1bc; tarsus 1 weakly to strongly asymmetrical; either ♀ laterite 7 present or urogenital area anteriorly fenced by strong setae. On Accipitridae, Psittacidae, Capitonidae, Muscicapidae, Dicuridae, Corvidae, Paradisaeidae; 7 species: *tarsata, trita, plana, fenestella, diluta, samoana, chalcolampra*.

**Icosta (Icosta) wenzeli** Maa, new species Fig. 5-7, 9, 10, 12, 63, 64, 85, 86, 135.


**Habitats.** Chiefly Philippine Subregion, at present known from lowlands in Mindanao and Leyte islands, also spreading to Palawan which belongs to Malaysian Subregion. Breakdown of above-given data: Psittaciformes: Psittacidae (*Tanygnathus*) 3, Cuculiformes: Cuculidae (*Centropus*) 1, Coraciiformes: Bucerotidae (*Buceros*) 1, Passeriformes: Corvidae (*Corvus*) 1. Probably breeding on Psittacidae.

**Systematics.** This species is named after Dr Rupert L. Wenzel of the Chicago Nat. Hist. Mus. as a token of my gratitude for his help during my studies and for my admiration of his achievement in the study of New World Streblidae. It is an anomalous member of this species-group and can be distinguished immediately by the scarcely deve-
Fig. 85-86. *Icosa* (*Icosa*) *wenzeli* Mañ, ♀ abdomen (85) and ♂ genitalia (86).

loped vibrissal process in combination with the narrow frontal process (in dorsal view), very short scutellar bristle and strongly asymmetrical tarsus 1. The first character is shared by *recessa* but the latter species has unusually broad frontal process (in dorsal view), long scutellar bristle, symmetrical tarsus 1 and differently shaped scutellum and wing. Superficially, *wenzeli* may also be confused with members of the Americana group but the asymmetry of tarsus 1 and the number and arrangement of spines under tarsus 3 make it unmistakable.

♀. *Color* fairly dark, wing weakly fuscous. *Head* (fig. 63): Occipital margin practically straight; vertical bristle 1/2–2/3 as long as notopleural bristle, often pale; postvertex short. Face wide, nearly parallel-sided. Frons proper short, very widely notched at middle; frontal process (fig. 6) less than 2/3 as long as palpus (fig. 5), apically almost membranous, in profile un-
usually short, broadly rounded at apex and separated from vibrissal process by very shallow angular notch. Vibrissal process in profile broad, broadly rounded, almost reaching same level of frontal process. Gula posteriorly spined. Thorax (fig. 64): Mesonotum 34X48; prescutum sparsely feebly striate all over; scutellum 10.5X26; posterolaterally rounded, posteriorly distinctly convex; scutellar bristle unusual, pale and slightly shorter than scutellum itself. Metapleurotergal callus with 2, rarely 3 spines. Prosternum (fig. 7) well sclerotized. Metasternal process hardly definable. Wing (fig. 135): 4.2-4.7 mm long; setulae covering all cells except 2m + 1a (posterior 1/2) and 2a; lm usually with short narrow bare stripe near base; 2bc 1/2 as long as lbc. Legs: Femur 1 (fig. 9) strongly swollen, basal part of its anterior surface very sparsely setose all over; anterior surface of femur 2 with 1 spine, with basal part largely bare. Tibia 3 as in fig. 12. Tarsal spines 1.1.1.0/2.1.1.0/3.2.1.1; tarsomeres 3 and 4 of foreleg (fig. 10) with outer apical lobes much longer than inner ones; tarsomeres 1 of hindleg 14X7, much shorter than 2+3+4 and as long as 5; tarsomeres 2-4 distinctly asymmetrical. Abdomen (fig. 85) with moderate long and robust setae; dorsal striolate area almost entirely bare; ventral setae on lateral area as long and robust as those on median area, although often darker, setae fencing urogenital area similar in robustness but longer than elsewhere on venter. Tergite 3 rather narrow; tergite 6 posteriorly concavely curved, with 4 pairs of bristles. Laterite 3 poorly sclerotized, with setae not longer (or hardly so) and more robust than near spiracles 4 and 5; laterite 7 undefinable. Postgenital plate with scattered minute setae.

♂. Similar. Foreleg with only 1.0.0.0 tarsal spine. Abdominal setae shorter. Aedeagus (fig. 86) short, apical part straight; paramere also short, apically decurved and narrowly rounded. Postgenital plate medially membranous, apical margin with 8-10 setae.

Icosta (Icosta) recessa (Maa) Fig. 4, 6, 7, 9, 10, 12, 80, 156.

Lynchia recessa Maa, 1964: 91, fig. 2-5, ♀. Type ♀ (GNV), ex (?) bird, Uganda.

Material. 2♂♂, 9♀♀. UGANDA: 3♀♀ (BMNH), Entebbe, ex Centropus superciliosus, IX.1951, Williams, 1♀ (MCZ), Bukinda, Kigezi, ex Clamator caffer #672, VII.1940, Hopkins; 1♂ (MCZ), Kampala, ex C. caffer, coll. Hopkins; 1♀ (MCZ), id., Centropus superciliosus #423, VIII.1939; 1♀ (MCZ), id., Cent. superciliosus luandae, I.1938, 1♂, 2♀♀ (MCZ), Kasokwe, Bunyoro, ex Cent. monachus fischeri, coll. Hopkins.

Habitats. Hitherto known only from Uganda. Probably breeding on Cuculiformes: Cuculidae (Centropus, Clamator).

Systematics. This is a rather isolated species and is placed here near the beginning of the subgenus because of the poorly developed frontal and vibrissal processes and the generalized features of tarsus 1 and abdomen. In the original description, it was placed in the Americana group and next to dukei, with which species it shares the angular vibrissal area and several other characters of minor importance. Following the discovery of the 2 new Oriental species jactatrix and elbeli, one of which is also parasitic on Cuculidae, it becomes very obvious that recessa is allied to them although the frontal, vibrissal and metasternal processes as well as scutellum in the last species is more generalized. A supplementary description follows. Vertical bristle nearly as long as notopleural bristle. Upper orbital bristle much finer than, and only ca 1/3 as long as, lower bristle. Frontal process (fig. 6) in dorsal view as in jactatrix and elbeli, in lateral view very broadly rounded off into vibrissal area, no incision or notch separating from latter. Vibrissal area angular, not protruding. Gula posteriorly lined with pale long setae. Palpus (fig. 4) shorter in proportion than in elbeli. Laterocentral setae of prescutum black, stiff, composed of both short and long ones. Scutellum normal in shape, posterior margin
evenly convex. Prosternum (fig. 7) with 4-7 pairs of soft setae. Metasternal process absent. Wing 5.0-5.5 mm long; vein M$_{3+4}$ at midpoint of its 2nd abscissa distinctly closer to M$_{1+2}$ than to 2A, although when wing surface fully stretched (as in fig. 4 of original description, here reproduced as fig. 80) it is almost equidistant to those 2 veins. Femur 1 (fig. 9) moderately swollen, with 4-6 spines on anterior surface, basal part of anterior surface covered with suberect setae all over; anterior surface of femur 2 with 2± spines and evenly setose. Tarsus 1 and tibia 3 as in fig. 10 and 12, respectively. Tarsal spines 2.1.1.0/2.1.1.0/2.2.1.1 in both sexes. Abdominal syntergite 1+2 laterally with more strong spines in ♂ than in ♀; chaetotaxy on membranous area distinctly stronger and more numerous in ♂; laterite 3 not definable, or hardly so, its setae in ♀ hardly dissimilar to those on surrounding area, in ♂ strong and somewhat spine-like; ♀ laterite 7 not definable; setae forming lateral fence of urogenital area in ♀ long, in ♂ moderately long. Aedeagus (fig. 156) much shorter in proportion than in elbell.

Fig. 87-88. Icosta (Icosta) jactatrix Maa, ♀ abdomen (87) and ♂ genitalia (88).
Icosta (Icosta) jactatrix Maa, new species

Fig. 3, 6, 7, 10, 12, 63, 76, 87, 88.

**Material.** 3♂, 4♀. Holotype ♀ (BISHOP 7585), allotype and 4 paratypes (BISHOP), 1 paratype (MCZ). NEW GUINEA: 2♂, 1♀ incl. allotype ♂, Oransbari, NW of Geelvink Bay, 3 m, ex Tanysiptera galatea, BBM 22386, 22409, II.1963, Richards & Thompson. Holotype ♂, Aholia, 50 m, SE New Guinea, ex kingfisher BBM 29090, X.1963, Clissold; 1♀, id., Amboga, 60 m, BBM 29929; 1♀, id., Jumbora, 80 m, BBM 29536. 1♂ (MCZ), Dobadura, SE New Guinea, ex kingfisher #352, U.S. Typhus Comm., det. Beq. as parallelefrons Speirs.

**Habits.** New Guinea, lowland; possibly oligoxenous on Coraciiformes: Alcedinidae or kingfishers. The species seems very rare and its population density is unusually low.

**Systematics.** Jactatrix clearly serves as a connectant between recessa and elbeli both in structure and distributional ranges. Bequaert’s interpretation of parallelefrons is not accepted here since the specimen involved obviously would not match the original description of that species. The name jactatrix (jactator, a boaster) is in allusion to the shape of frons.

♀. Similar to elbeli (next species) except for the following points. Head (fig. 63): Postvertex fairly long. Face moderately wide, narrowed anteriorly. Frontal process (fig. 6) more than 1/2 as long as palpus (fig. 3). Vibriassal process slightly shorter than wide at base. Thorax: Mesonotum 32×57; scutellar bristle normal; scutellum 9×32. Prosternum (fig. 7) more acute, usually with only pale fine setae; mesosternum shallowly notched anteriorly. Wing (fig. 76) 4.6-5.1 mm long; setulae less extensive, cells sc and lr practically entirely bare, 2m+1r with only very small triangular setulose patch at antero-apical corner. Tarsus 1 and tibia 3 as in fig. 10 and 12, respectively. Tarsomere 1 of hindleg as long as 2+3+4 and as 5. Abdomen (fig. 87) very finely setose; setae on lateral area longer and more robust than on median ventral area; laterites 2 and 3 each with only 1-2 spines in addition to ordnary fine setae; laterite 7 small, roundish.

♂. As in ♀, scutellar bristle normal, cells sc and lr almost entirely bare, setae on lateral abdominal area slightly longer and much finer, and spines on laterites 2 and 3 fewer, longer and finer. Tarsal spines of legs 1 and 2 similar in robustness. Aedeagus (fig. 88) more slender. Other characters as in ♀ elbeli.

Icosta (Icosta) elbeli Maa, new species

Fig. 3, 6–8, 10, 11, 62, 64, 73, 89, 90.

**Material.** 11♂, 27♀. Holotype ♀ (BISHOP 7586), allotype ♂ and most paratypes (BISHOP); 1 paratype each (BMNH, CNHM and MCZ).

ASSAM: Paratype ♀ (BMNH 1924.100), Mungpoo, ex Cuculus sp., IV.1920, Senior-White.

BURMA: Paratype ♀ (MCZ), Miftkyina, ex Centropus sinensis intermedius, VI.1945.

MALAYA: Paratypes, 1♂, 1♀, Selangor, ex *C. sinensis*, BL 3186, Lim.

BORNEO: Paratypes, 2♂♂, Ranau, Sabah, wooded area, ex *Phaenicophaeus curvirostris*, PJ 9223, IX.1960, Kuntz.

PHILIPPINES (Palawan): Paratype ♀, Macagua, Brooke’s Point, ex *Ph. curvirostris*, BBM 761, III.1962, Thompson.

Habitats. Indo-Chinese and Malaysian Subregions, so far known from Assam, Burma, Thailand, Malaya, Borneo and Philippines (Palawan). Apparently breeding on Cuculiformes: Cuculidae (*Centropus, Phaenicophaeus*). Highest density per infested bird was 14 flies (RE 7066, ex *Centropus*).

Systematics. I take much pleasure in naming this interesting species after Dr Robert E. Elbel. It is very closely allied to *jactatrix* but a little more specialized in the thoracic bristles and abdominal setae. The different host preference of the 2 species provides another exceptional case of the parallelism of host-parasite evolution.

♀. Color dark, wing weakly fuscous. Head (fig. 82): Occipital margin hardly concave, virtually straight at median section; vertical bristle 2/3 as long as notopleural bristle; postvertex
short. Face wide, almost parallel-sided. Frons proper short; frontal notch somewhat U-shaped; frontal process (fig. 6) less than 1/2 as long as palpus (fig. 3), quite unusual in dorsal view, with basal 2/3 very broad and suddenly narrowed at apical 1/3, thus leaving inner margin distinctly S-shaped and extreme apex thin and leaf-like; in profile, entire process very gently recurved, apically narrowly rounded and anteriorly only slightly surpassing level of vibrissal process which is large, in profile normal, triangular, as long as wide at base. Gula posteriorly spinose. Thorax (fig. 64): Mesonotum 49X73; 1 humeral and 1 notopleural bristle; scutellar markedly finer and often paler than other major bristles; scutellum 14X40, posterolaterally rounded, posteriorly very weakly convex, practically straight at median section. Metapleurotergal callus usually with 3 spines. Prosternum (fig. 7) weakly sclerotized, with 2-3 pairs of short stiff setae. Metasternal process hardly definable. Wing (fig. 73): 6.2-6.6 mm long; setulae not extensive, not covering cells lbc, 2bc, lm (basal 1/4) and 2a; 2m+1a with large triangular setulose patch which is about 2/3 as long as anterior margin and 3/4 of apical margin. Legs: Femur 1 (fig. 8) moderately swollen, basal part of its anterior surface uniformly covered with stiff setae; anterior surface of femur 2 with 2± spines, with small bare area at a point of basal 1/3. Tibia 3 as in fig. 11. Tarsal spines 2.1.0/2.1.0/3.2.1.1; tarsomeres 3-4 (fig. 10) of foreleg symmetrical; tarsomeres 1-4 of hindleg all asymmetrical; tarsomere 1 of same leg 15X7, as long as 2+3+4, slightly longer than 5, ventrally with 5-6 setae near base which are noticeably more robust and probably represented spines at same place found in all other groups in the genus except Minor. Abdomen (fig. 89) with short setae on dorsum, moderately long ones on venter; dorsal striolate area largely bare; setae on lateral area slightly stouter and often darker than those on median area; ventral setae fencing urogenital area longer and more robust than elsewhere. Tergite 3 narrow, tergite 6 with 4-5 pairs of bristles. Laterite 3 weakly sclerotized, and as in laterite 2, almost entirely covered with rather strong spines; laterite 7 large, elongate, with 4-6 setae and bristles. Postgenital plate with few minute setae.

♂. Similar. Cell lm largely bare, with narrow setulose stripes along anterior margin and near apical margin; 2m+1a with only few setulae very narrowly along extreme apical margin. Tarsal spines on foreleg much weaker than on midleg. Aedeagus (fig. 90), short, apical 2/3 straight; paramere with apical part gently decurved. Postgenital plate short, very weakly bilobed, with few setae on apical margin.

Icosta (Icosta) tarsata Maa, new species


Habitats. Thailand, 600-1000 m, known only from Passeriformes: Muscicapidae (Myiophoneus).

Systematics. Closely allied to fenestella but size much larger, face wider, palpus and tarsomere 1 of hindleg shorter and abdominal setae stronger. In size, it approaches chalcolampra but differs in the shape of face, palpus, tarsi 1 and 3 and in the abdominal chaetotaxy. The name tarsata refers to the unusually short tarsus 3, particularly segment 1.

♀. Color fairly dark, wing weakly fuscous. Head (fig. 63): Occipital margin hardly convex, with median 1/2 practically straight; vertical bristle slightly shorter than notopleural bristle; postvertex short. Face very wide, weakly narrowed anteriorly. Frons proper short; frontal notch broad, subangular; frontal process (fig. 6) slightly shorter than palpus (fig. 5), in profile gently decurved, apically pointed. Vibrissal process in profile normal, triangular, about as wide
as apical part of frontal process and as long as wide at base. Gula posteriorly spinose. Thorax
(fig. 64): Mesonotum 43 × 56; prescutum densely strongly striate all over; scutellum 12 × 28,
posterolaterally rounded, posteriorly distinctly convex. Metapleurotergal callus bearing 5 spines.
Prosternum (fig. 7) well sclerotized, bilobed, with 2–4 pairs of stiff setae. Metasternal process
poorly developed, broadly rounded. Wing (fig. 83) 5.7–5.9 mm long; setulae covering all cells
except 2m+la (posterior 1/2) and 2a. Tibia 3 as in fig. 12. Tarsal spines 2.1.1.0/2.1.1.0/3.2.1.1;
tarsomeres 3 and 4 (fig. 10) of foreleg with outer apical lobes practically as long as inner;
tarsomere 1 of hindleg 13 × 9.5, subequal in length to 2+3 and 2/3 as long as 5; tarsomeres 2–4 of
same leg weakly asymmetrical. Abdomen (fig. 91) with rather long and fine setae; dorsal strio-
late area with 3 groups of fine setae; ventral setae on lateral area longer and slightly more
robust than on median area, those fencing urogenital area not noticeably longer and more ro-
bust. Tergite 3 narrow; tergite 6 with posterior margin deeply broadly notched, with 10± pairs
of bristles. Laterite 3 not definable; 7 fairly large, with 3–4 bristles and 1–2 setae. Postgeni-
tal plate with scattered setae.

♂. Similar. Syntergite 1+2 posterolaterally with dense, very stout spines; tergite 3 large;
setae around spiracle 3 of similar length and robustness as those around spiracles 4–5. Aedeagi-
gus (fig. 93) fairly short, slender and straight at apical part; paramere also apically straight.
Postgenital plate (fig. 92) with 2± rows of setae.
Icosta (Icosta) trita (Speiser)  

Fig. 5-7, 9, 10, 12, 63, 64, 84, 94, 95.

Olfersia trita Speis., 1905a: 357. Type ♂ (GNV), ex Megalaima franklinii ramsayi, Tenasserim.

Material. 92♂♀, 107♂♀.


VIETNAM: 1♂, Kela, ex Pycnonotus #218, X.1960.

FIG. 94-95. Icosta (Icosta) trita Speis., Taiwan, ♀ abdomen (94) and ♂ genitalia (95).

Habitats. Indo-Chinese Subregion, at present known from Burma, Thailand, Vietnam and Taiwan, largely found in lowlands. Obviously confined to Piciformes: Capitonidae (*Megalaima*). The single record ex *Pycnonotus* was probably a straggler or a result of contamination. Highest density per infested bird was 5 flies (TMT 971, 1583, 1650, 1818, all ex *Megalaima*). In Taiwan, 36.3% of 259 *Megalaima* were found infested and in average, 2 flies were collected ex each infested bird (Maa et al. 1965: 398). Obviously by oversight, Speiser (1908c: 304) wrongly listed *trita* as a Neotropical species.

Systematics. Bequaert (1953: 140, 272) confused *trita* with *pollicipes* [=*chalcolampra*] and suggested them to be possibly synonymous. In fact, the 2 species are different in body size, color, structure and host preference, and *trita* is a close relative of *tarsata* and *fenestella*. In addition to characters mentioned in the key, it can be easily separated from the last species by the smaller size, longer postvertex, shorter spines on femur 2, shorter tarsus 3, heavier abdominal setae and shorter stouter aedeagus. The unique type of this species is in rather poor condition, its wings are partly folded and partly missing.

♀. Color very dark, with metallic luster, wing weakly fuscous. Head (fig. 63): Occipital margin practically straight; vertical bristle slightly shorter than notopleural bristle; postvertex moderately long. Face fairly wide, weakly convergent forward. Frons proper rather long; frontal notch broad, rounded; frontal process (fig. 6) 2/3 as long as palpus (fig. 5), in profile broad, gently recurved, apically narrowly rounded. Vibrissal process in profile normal, triangular, as wide as apical part of frontal process, and as long as width at base. Gula posteriorly setose, with 1-2 spines intermixed. Thorax (fig. 64): Mesonotum 32×40; prescutum densely strongly striate all over; scutellum 8×21, posterolaterally rounded, posteriorly distinctly convex. Mesepimerus usually lacking, rarely with 1 spine. Metapleurotergal callus with 2-3 weak spines. Prosternum (fig. 7) transversely linear, entirely overlapped by mesosternum, with 1 pair of pale short setae. Metasternal process hardly definable, represented by very weak curvature of margin. Wing (fig. 84) 3.5-4.2 mm long; setulae extensive leaving only cells 2bc (largely or entirely), 2m+lta (largely) and 2a (entirely) bare; 2m+lta anteroapically with small triangular setulose area which is hardly longer than wide, not more than 1/4 as long as abscissa 2 of vein M3+4. Legs: Femur 1 (fig. 9) strongly swollen, basal part of its anterior surface largely bare, with only few stiff setae along lower margin and near transverse row of spines; anterior surface of femur 2 with 5± short spines, its basal part largely bare. Tibia 3 as in fig. 12. Tarsal spines 2.1.0/2.1.0/2.2.1.1; spines on tarsus 1 generally weaker than on 2; tarsomeres 3 and 4 (fig. 10) of foreleg with outer apical lobes scarcely longer than inner lobes; tarsomere 1 of hindleg 11×7.5, shorter than 2+3+4 and than 5; tarsomere 2 of same leg distinctly transverse, 3 and 4 weakly asymmetrical. Abdomen (fig. 94) with rather stout setae; dorsal striolate area virtually entirely bare; ventral setae on median area long, fine, usually pale, those on submedian area short but stiff, on lateral area long and robust; setae fencing urogenital area longer or more robust on ventral disc. Tergit 3 large; 6 posteriorly broadly notched, with 5± pairs of bristles. Laterite 3 not definable; setae near spiracle 3 similar in length and robustness to those near spiracles 4 and 5; laterite 7 large, with 2-3 bristles and 1-3 setae. Postgenital plate with scattered minute setae.
♂. Similar. Syntergite 1+2 and laterite 2 sparsely covered with spine-like setae; setae on laterite 3 normal. Aedeagus (fig. 95) short, rather robust and with apical part straight; paramere apically hardly decurved. Postgenital plate not bilobed, with few setae on apical margin.

**Icosta (Icosta) plana** (Walker)  Fig. 4, 6, 7, 9, 10, 12, 63, 79, 96, 97.

*Ornithomyia plana* Wk., 1891: 254. Type (probably ♀), (BMNH), ex (?) bird, Vogelkop, New Guinea.

*Olfersia papuana* Rndn., 1878: 162. Type ♂ (GNV), ex (?) bird, Vogelkop, New Guinea.

**Material.** 1♂, 26♀♀. NW NEW GUINEA: 1♂, Vogelkop, Kebar Valley, ex *Paradisaea m. minor*, BBM 810, I.1962, Quate; 1♀, *id.*, *Pitta erythrogaster macklotii*, BBM 789. 2♀♀, Archbold Lake, ex *Pitohui kirhocephalus*, BBM 475, XII.1961, Quate. 1♂, Oransbari, 3 m, NW of Geelvink Bay, ex *P. ferrugineus*, BBM 22317, I.1963, Richards & Thompson; 2♂♂, 1♀, *id.*, *Cracticus cassicus*, BBM 22310; 2♀♀, *id.*, *C. quoyi* BBM 22424, II.1963. SW

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Fig. 96-97. *Icosta (Icosta) plana* Wk., ♀ abdomen (96) and ♂ genitalia (97).

Habitats. New Guinea, lowland, up to 900 m. Probably breeding on small passerines, particularly Paradisaeidae. Analysis of available data follows. Columbiformes: Columi­dae ("dove") 2 records; Psittaciformes: Psittacidae (Trichoglossus) 1; Passeriformes: Pica­dae (Pitta) 1; Muscicapidae (Pachycephalopsis 1, Pitohui 2); Corvidae (genus indet.) 1; Oriolidae (Oriolus) 2; Cracticidae (Cracticus) 5; Ptilonorhynchidae (Ailuroedus) 3; Paradisaeidae 7 (Paradisaea 2, genera indet. 5). Highest density per infested bird was 2♂♀ (BBM 22310 ex Cracticus).

Systematics. This species is so far known from very short and inadequate descriptions by Walker and Rondani (l.c.) and their types. It is a close relative of fenestella and by convenience, can be recognized by the pale pattern and slightly stouter abdominal setae.

♂. Color very pale, dorsally yellowish and ventrally whitish, wing very weakly tinted fuscous. Head (fig. 63): Occipital margin hardly concave; vertical bristle slightly shorter than notopleural bristle; postvertex short. Face wide, very weakly narrowed anteriorly. Frons proper short: frontal notch narrow, subangular: frontal process (fig. 6) 2/3 as long as palpus (fig. 4), in profile very broad, gently decurved, narrowly rounded apically. Vibrissal process in profile normal, large, triangular, slightly wider at base than long. Gula posteriorly spined. Thorax: Mesonotum 32X41; prescutum densely strongly striate all over; scutellum 9X23. Metapleuron callus with 4± spines. Prosternum (fig. 7) apparently not definable. Metasternal process poorly developed. Wing (fig. 79) 4.4-8.8 mm long; setula-distribution as in fenestella. Legs: Femur 1 (fig. 9) strongly swollen, basal part of its anterior surface largely bare, with only few spinules lined along lower margin and near transverse row of major spinules; anterior surface of femur 2 with 5± spinules, and with basal part largely bare. Tibia 3 as in fig. 12. Tarsal spines 2.1.0/ 2.1.1.0/2.2.1.1; tarsomeres 3 and 4 (fig. 10) of foreleg with outer apical lobes much longer than inner ones; tarsomere 1 of hindleg 16X6.5, slightly longer than 2 to 4, subequal to 5; tarsomeres 2-4 of same leg asymmetrical. Abdomen (fig. 96) very finely setose; dorsal striolate area with few scattered setae; ventral setae on lateral area distinctly more robust than on median area, those fencing urogenital area largely pale and very fine, but here and there mixed with 1 or 2 longer, more robust black ones. Tergite 3 fairly large; tergite 6 transversely rectangu­lar, with 6-7 pairs of bristles. Laterite 3 hardly definable, its setae similar to those near spiracles 4 and 5; laterite 7 at most poorly definable, with 1 bristle and 1-3 setae. Posterogynal plate with few minute setae.

♀. Similar. Syntergite 1+2 posterolaterally with some very stout spines; setae on laterite 3 hardly more robust than those near spiracles 4 and 5. Aedeagus (fig. 97) long, almost straight at apical part; paramere apically blunt, almost straight. Postgenital plate not bilobed, with 2-3
rows of fine setae near apical margin.

**Icosta (Icosta) fenestella** Maa, new species  
Fig. 3, 6-8, 10, 11, 62, 64, 74, 98, 99.

**Material.** 63♀♀, 95♂♂. Holotype ♀ (BISHOP 7588), allotype ♂ and most paratypes (BISHOP); 1, 2, 4 and 7 paratypes (BMNH, MCZ, USNM and CNHM), respectively.

**BURMA:** Paratype ♀ (MCZ), Myitkyina, ex red-billed blue pie, I.1945; 1♂ (MCZ), id., tree pie, III.1945.


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Fig. 98-99. *Icosta (Icosta) fenestella* Maa, Thailand, ♀ abdomen (98) and ♂ genitalia (99).


BORNEO: Paratype ♀ (USNM), Mt Kinabalu, 2500 m, Sabah, VII.1951, Traub & Johnson. 1♂ (BMNH), Kiation, 1000 m, Mt Kinabalu, at light, IV.1929, Pendlebury.

PHILIPPINES (Palawan): Paratype ♀, Pinigisan, Mantalingajan Range, Brooke's Pt, ex bird BBM 1547, IV.1962, Thompson.

Habitats. Indo-Chinese and Malaysian Subregions, at present known from Burma, Thailand, Taiwan, Java, Komodo I., Borneo and Palawan, lowland, up to 2500 m. Obviously
breeding on Passeriformes, particularly Corvidae, Dicruridae and Muscicapidae; with stray records from Falconi-, Galli-, Columbi-, Strigi- and Piciformes. Analysis of available data follows. Falconiformes: Accipitridae (Accipiter) 1 record; Galliformes: Phasianidae (Bambuscota) 1; Columbiformes: Columbidae (genus indet.) 1; Strigiformes: Strigidae (Otus) 1; Piciformes: Picidae (Picus) 1; Passeriformes: Pityiidae (Pitta) 2; Irenidae (Irena) 1; Campephagidae (Pericrocous) 2; Muscicapidae 8 (Garrulax 4, Monticola 2, Muscica 1, Yuhina 1); Oriolidae (Oriolus) 1; Procrididae (Dicrocr) 14; Corvidae 53 (Dendrocitta 38, Urocissa 13, genera indet. 2). Highest density per infested bird was 33.3 (TMT 1955) ex Urocissa, Taiwan. The infestation rate in Taiwan on 234 Dendrocitta and 26 Urocissa examined were 19% and 58% respectively (Maa et al. 1965, as Lynchia sp. "P").

**Systematics.** This new species is a relative of *trita* and *chalcolampra*. They coexist in Burma, Thailand, Taiwan and probably several other countries. Chief differences are with the body size, shape of femur 1, tarsi 1 and 3 and abdominal chaetotaxy. The smaller bare stripe on cell 1m, as suggested by its name *fenestella* (Latin, a small window, a little opening), serves as a convenient character for *fenestella* but is by no means always reliable.

♀. Differing from *chalcolampra* in the following points. **Color paler.** **Head:** (fig. 62) Frontal notch rather narrow. Palpus and frontal process in profile as in fig. 3 and 6, respectively. **Thorax** (fig. 64): Mesonotum 35×49; prescutum less strongly striate; scutellum 10×26. Prosternum (fig. 7) apparently not definable. **Wing** (fig. 74) 42.4-48 mm long; setulae more extensive, cells c, se, lr and ldc entirely or almost entirely setulose; basal bare stripe of 1m generally much smaller and narrower. Femur 1 (fig. 8) similar to that in *trita*, basal part of anterior surface largely bare; anterior surface of femur 2 more strongly setose and with much longer but less robust spines, with small bare area at a point of basal 1/3. Tibia 3 as in fig. 11. Tarsal spines 2.1.1.0/2.1.1.0/3.2.1.1; tarsomere 3 and 4 (fig. 10) of foreleg with outer apical lobe hardly longer than inner lobes; tarsomere 1 of hindleg 14×9, almost as long as 2+3, much shorter than 5, ventrally with inner apical spine much paler and smaller than outer ones. **Abdomen:** Ventral setae (fig. 98) on median area including those fencing urogenital area very fine, generally pale; setae on submedian area shorter, those on lateral area longer and more robust. Laterite 7 well sclerotized, with 1 bristle and 1-2 setae.

♂. Similar. Setae on laterite 3 uniform in length and robustness, similar to those near spiracles 4 and 5. **Aedeagus** (fig. 99) more slender and straight at apical part; paramere not curved at apex. Postgenital plate with fewer setae.

The single ♀ from Borneo is noticeably smaller (wing 3.8 mm long), with cell 2be almost entirely setulose and metapleurotergal spines distinctly weaker.

**Icosta (Icosta) diluta** Maa, new species Fig. 3, 6, 7, 10, 11, 62, 64, 71, 100.

**MATERIAL.** 2♀♀. Holotype ♀ (Bishop 7589) and paratype (Bishop). NE NEW GUINEA: Holotype ♀, Bulolo R., Wau area, 900 m, ex Coracina caeruleogrisea, BBM 27885, IV.1963, Shanahan. Paratype ♀, Wau, 1200 m, ex bird BBM 20157, VII.1962, Sedlacek.

**Habitats.** New Guinea, 900-1200 m, probably breeding on passerine birds. The only available host record is a campephagid.

**Systematics.** As suggested by the name, *diluta* is chiefly characterized by the little setulose wing and fine scattered abdominal chaetotaxy. The closest relative appears to be...
samoana in which the occipital margin is very weakly concave, wing more extensively setulose, abdomen more densely setose and metasternal process more prominent.

♀. Color dark, wing weakly fuscous. Head (fig. 62): Occipital margin very weakly convex vertical bristle of normal length; postvertex short. Face moderately wide, narrowed anteriorly. Frons proper short; frontal notch narrow, angular; frontal process (fig. 6) 1/2 as long as palpus (fig. 3), in profile gently decurved, apically pointed. Vibrissal process in profile normal, slightly shorter than wide at base, apically subacute. Gula posteriorly spinose. Thorax (fig. 64): Mesonotum 40×57; prescutum medially hardly sculptured, laterally densely, feebly striate; 1 humeral and 1 mesopleural bristle; scutellum 12×30, posterolaterally rounded, posteriorly strongly convex. Metapleurotergal callus with 4-5 spines. Prosternum (fig. 7) very poorly sclerotized. Metasternal process hardly definable. Wing (fig. 71) 5.2 mm long; setulae not extensive, with cells 1bc, 2bc, 1m (basal 3/5), 2m+1a (entirely or nearly so), 2a all bare; cells 2m+1a almost entirely bare in paratype, with short median setulose stripe near apex in holotype. Femur 1 moderately swollen, basal 1/2 of anterior surface sparsely covered with very fine short pale setae, only its lower margin with 2 rows of black and stronger setae. Tibia 3 as in fig. 11. Tarsal spines 2.1.1.0/2.1.1.0/3.2.1.1; tarsomeres 3-4 (fig. 10) of foreleg symmetrical; tarsomere 1 of hindleg 18×7, hardly shorter than 5, as long as 2+3+4, tarsomeres 2-3 of same leg distinctly asymmetrical, 4 hardly so. Abdomen (fig. 100) with short fine scattered setae; dorsal striolate area practically bare; setae on lateral area longer and with much larger basal papillae; ven-
tral setae on median area fine, scattered; urogenital area not fenced by strong setae. Tergite 3 narrow, tergite 6 with 4-5 pairs of bristles. Laterite 3 not definable; laterite 7 large, elongate, with 2 bristles and several setae. Postgenital plate apparently bare. ♂ unknown.

*Icosta* (*Icosta*) *samoana* (Ferris)  Fig. 140, 179.

*Lynchia samoana* Ferr., 1927b: 17, fig. 5, 6, ♂ ♂. Type ♂ (BMNH), ex *Turdus samoensis*, Samoa.

**Material.** 1 ♂ (MCZ), no collection data, compared with type and labeled by Bequaert as *L. samoensis*!

**Habitus.** Samoan Is., lowland, so far only recorded from Passeriformes: *Muscicapidae* (*Myiagra, Turdus*).

**Systematics.** This species appears to be related to *diluta* of New Guinea and as admirably illustrated by Ferris, is chiefly characterized by the distribution of setulae on wing (fig. 140) and of suberect setae on basal part of femur 1, the poorly developed metasternal process, the uniformly fine setae on abdominal membranous area and the minute ♂ laterite 7. See Addendum.

*Icosta* (*Icosta*) *chalcolampra* (Speiser)  Fig. 2, 6-8, 10, 11, 68, 101, 102.

*Olfersia chalcolampra* Speis., 1904a: 335. Type ♀ (GNV), ex (?) bird, NE New Guinea.

*Lynchia pollicipes* Ferr., 1927c: 228, fig. 16, 17, ♂ ♂. Type: ♂ (UCB), ex *Accipiter* spp., Palawan, Philippines.

**Material.** 68♀♂, 148♀♂.

**BURMA:** 1 ♂, 2♀♀ (MCZ), Myitkyina, ex *Ketupa zeylonensis*, X.1945, Stager & Jellison; 1 ♀ (MCZ), id., cuckoo-shrike, II.1945; 1 ♀ (MCZ), id., *Streptopelia chinensis*. 1 ♂, 1 ♀ (MCZ), no data except flid. #3283, perhaps from Myitkyina.


**PHILIPPINES:** 1 ♀, 3♀♀ (CNHM), Puerto Princesa, nr sea level, Palawan, ex *Centropus sinensis bubutus*, #2466, 2595, IV.1947, Werner. 1 ♀, Limot Mati, Davao Prov., Mt
Fig. 101-102. *Icosta* (*Icosta*) *chaleolampra* Speis., New Guinea, ♀ abdomen (101) and ♂ genitalia (102).

Mayo, Mindanao, ex *Chalcophaps* *l. indica*, B 8326, VI.1965, Rabor.

NW NEW GUINEA: 1♀ (MCZ), “Dutch New Guinea”, ex hawk ♂♀ B-C 15, Jewett & Hoogstraal. 1♀ (MCZ), Doromana, ex parrot ♂♀ B-C 12-13, III.1945, Jewett & Hoogstraal. 1♂, Vogelkop, Kebar Valley, 550 m, ex *Geoffroyus* *geoffroyi* *pucherani*, BBM 771, I. 1962, Quate; 1♀, id., *Mino* *d. dumontii*, BBM 749; 5♂♀, id., *Phonygammus* *k. keraudreni*, BBM 779; 6♂♂, id., *Probosciger* *a. australis* *goliath*, BBM 739; 1♂, id., *Trichoglossus* *h. berauensis*, BBM 764. 1♂, Nabire, N of Geelvink Bay, ex *Cacatua* *galerita*, BBM 21560, VIII.1962, Clissold. 1♀, Oransbari, 3m, NW of Geelvink Bay, ex *C. galerita*, BBM 22346, I.1963, Richards & Thompson; 1♂, id., *Lorius* *lory*, BBM 22290. SW NEW GUI-NEA: 1♂, 6♂♀, Bomberi, 700-900 m, nr Fak Fak, ex corvid TMP 22, VI.1959, Maa. NE
NEW GUINEA: 1♀, Bulolo, 700 m, ex Accipiter novaehollandiae, HC 231, VI.1962, Clissold; 1♀ id., Falco severius, HC 37. 1♀, Bulolo R., 900 m, ex Coracina caeruleogrisea, BBM 27885, VI.1963, Shanahan. 1♂, Bulldog Rd, 2500 m, Wau area, ex Gymnophaps albertisi, HC 231, VI.1962, Clissold; 1♂, Covia, Wau area, 1300 m, ex Trichoglossus haematodus, BBM 28490, VI.1963, Shanahan. 1♀, Forestry, Morobe Distr., 1300 m, ex honeyeater BBM 28642, VIII.1963, Clissold. 1♀, Finschhafen, ex Aviscea suberifista, BBM 27661, IV.1963, Clissold. 1♀, Green R., Sepik Distr., 160 m, ex Accipiter novaehollandiae, BBM 22697, VI.1963, Temple. 1♂, Karimui, 1100 m, ex bird BBM 20066, VII.1963, Sedlacek. 1♂, May R., Sepik Distr., 130 m, ex Larius roratus, BBM 20658, VI.1963, Temple. 1♂, Monke Mt, 800 m, ex Alisterus chloropterus, HC 43, III.1962, Clissold. 1♀, Nakata Ridge, Wau area, 1300 m, ex Coracina caeruleogrisea, BBM 28495, VI.1963, Shanahan; 1♀, green-back pigeon BBM 29231, IX.1963, Clissold; 2♀♂, id., Centropus ateralbus, BBM 29242, 29253, 29281. 1♀, Jumbora, 60 m, ex Corvus orru, BBM 29235, 29274, 29270, 29294, IX-X.1963, Clissold; 2♀♂,id., M. dumontii, BBM 29274, 29271, 50185. 1♀, Buka Bara, sea level, ex Mino dumontii, BBM 28815, IX.1963, Shanahan. 1♀, Cape Killerton nr sea level, ex pigeon BBM 29231, X.1963, Clissold; 2♀♂, id., Lorius lory, BBM 29242, 29253, 29281. 1♀, Embi Lake, 100 m, ex M. dumontii, BBM 29341, X.1963, Clissold. 1♀, Jumbora, 60 m, ex Corvus orru, BBM 28735, 28747, 28770, 29346, IX-X.1963, Clissold; 2♀♂, id., M. dumontii, BBM 29745, 28774; 1♀, dove BBM 29693; 1♀, id., Accipiter novaehollandiae, BBM 28746; 1♀, pigeon BBM 29363; 1♀, id., Larius roratus, BBM 29695; 1♀, id., Lorius lory, BBM 29242, 22953, 29281. 1♀, Mt Lamington, Amboga R., 1500 m, ex Hencopolis longicauda, BBM 25258, VII.1966. 2♀♂, Popondetta, N. Distr., 70 m, ex Accipiter cirrocephalus, BBM 29267, IX.1963, Clissold; 1♀, id., Mino dumontii, BBM 29267; 1♀, id., Aplonis, BBM 28707. 1♀, Simburu, 80 m, ex A. novaehollandiae, BBM 28727, IX.1963, Clissold. 2♀♂, 4♀, Soputa, 30 m, ex Larius roratus, BBM 29762, 29764, 29832, 29862, X.1963, Clissold; 3♀♂, id., Lorius lory, BBM 29717, 29859; 1♀, bird-of-paradise BBM 29869; 1♀, hawk BBM 29842; 5♀, id., Accipiter novaehollandiae, BBM 29867; 1♀, Tegona, ex parrot BBM 50481, IV.1964, Clissold. 1♀, Zenani, 130 m, ex L. roratus, BBM 29956, X.1963, Clissold.

NEW BRITAIN: 2♀ (KBH), Kwalakessi, VII.1962, Noona Dan Exped. 1♀, Gaulim, ex Lurus lory, BBM 2875, XI.1962, Clissold; 3♀♂, 3♀, id., Larius roratus, BBM 20682, 20873; 1♀, 1♀, id., Accipiter lutoeschistaceus, BBM 20689. 1♀, Riaet, ex Acc. novaehollandiae, BBM 20734, XI.1962, Clissold; 1♀, id., Atratus insignis, BBM 20711; 1♀, 3♀♂, id., Centropus ateralbus, BBM 20735; 3♀♂, id., C. violaceus, BBM 20714, 20743. 4♀♂, 1♀, Mt Sinewet, ex C. violaceus, BBM 20768, 20782, XI.1962, Clissold. 1♀, Taliligap, ex Larius roratus, BBM 20664, X.1962, Clissold. 1♀ (MCZ), "New Britain", ex Caloenas n. nicobarica, P 107, Coultas. 1♀ (MCZ), Nakanai Mts, ex Centropus violaceus, P 134, Coultas.

SOLOMON IS.: 1♀, Toumoa, Fauro, 10 m, ex Haliasatur indus, BBM 23795, IV.1964, Temple. 1♀, 3♀♂, Malangona, Choiseul-Fauro, 10 m, ex Corvus woodfordii, BBM 23724,
III.1964, Temple. 3♀♀, Pusisama, Vella Lavella, 5 m, ex Centropus phasianinus, BBM 23132, 23187, XI.1963, Temple; 1♂, 2♀♀, id., Aplonis grandis, BBM 23251; 1♀, 4♀♀, id., Larius roratus, BBM 23130, 23204, 23206, 23245. 1♀, Ulo Crater, Vella Lavella, 10 m, ex L. roratus, BBM 7510, XII.1963, Temple; 1#, 2££, id., Aplonis grandis, BBM 23251; 1#, 4££, id., Larius roratus, BBM 23130, 23204, 23206, 23245. 1♀, Ulo Crater, Vella Lavella, 10 m, ex L. roratus, BBM 7510, XII.1963, Temple; 1#, 2££, id., Aplonis grandis, BBM 23251; 1#, 4££, id., Larius roratus, BBM 23130, 23204, 23206, 23245. 1♀, Ulo Crater, Vella Lavella, 10 m, ex L. roratus, BBM 7510, XII.1963, Temple; 1#, 2££, id., Aplonis grandis, BBM 23251; 1#, 4££, id., Larius roratus, BBM 23130, 23204, 23206, 23245. 1♀, Ulo Crater, Vella Lavella, 10 m, ex L. roratus, BBM 7510, XII.1963, Temple; 1#, 2££, id., Aplonis grandis, BBM 23251; 1#, 4££, id., Larius roratus, BBM 23130, 23204, 23206, 23245. 1♀, Ulo Crater, Vella Lavella, 10 m, ex L. roratus, BBM 7510, XII.1963, Temple; 1#, 2££, id., Aplonis grandis, BBM 23251; 1#, 4££, id., Larius roratus, BBM 23130, 23204, 23206, 23245. 1♀, Ulo Crater, Vella Lavella, 10 m, ex L. roratus, BBM 7510, XII.1963, Temple; 1#, 2££, id., Aplonis grandis, BBM 23251; 1#, 4££, id., Larius roratus, BBM 23130, 23204, 23206, 23245. 1♀, Ulo Crater, Vella Lavella, 10 m, ex L. roratus, BBM 7510, XII.1963, Temple; 1#, 2££, id., Aplonis grandis, BBM 23251; 1#, 4££, id., Larius roratus, BBM 23130, 23204, 23206, 23245.


Habits. Widely spread over Oriental Region, at present known from Burma, Thailand, Philippines, New Guinea, New Britain, Solomon Is., and Queensland. Obviously breeding on Falconi- and Psittaciformes, and perhaps also Columbi-, Cuculi- and Passeriformes; with stray records from Galli-, Strigi- and Coraciiformes. Analysis of available data follows. Falconiformes: Accipitridae 35 records (Accipiter=Astur 23, Aviceda 2, Elanus 1, Halistur 1, Henicopernis 1, Milvus 1, genera indet. 3); Falconidae {Falco) 2; Galliformes: Phasianidae (Gallus) 1; Columbiformes: Columbidae 13 (Caloenas 1, Chalcophaps 2, Streptopelia 2, Treron 1, genera indet. 7); Psittaciformes: Psittacidae 39 (Alisterus 1, Caecatu=Kakatoe 3, Geoffroyus 1, Larius 14, Lorius 8, Proboceiger 1, Trichoglossus 2, genera indet. 9); Cuculiformes: Cuculidae 13 (Centropus 12, Cuculus 1); Strigiformes: Strigidae (Bush) 1; Coraciiformes: Alcedinidae 2 (Dacelo 1, genus indet. 1); Passeriformes: Eurylaimidae (Corydon) 1; Campephagidae 3 (Coracina 2, genus indet. 1); Meliphagidae (genus indet.) 1; Sturnidae 10 (Aplonis 4, Mino 6); Dicruridae (Dicurus) 1; Corvidae 8 (Corvus 7, genus indet. 1); Paradisaeidae 2 (Corythaeolus 1, genus indet. 1). Besides these, Psittacidae: Prioniturus was also listed as host by Ferris (I.c.). Highest densities per infested bird were 6 flies (BBM 739 ex Proboceiger) in New Guinea, 4 flies (BBM 23724 ex Corvus) in the Solomon Is. The average infestation density of this fly in other countries is lower.

Systematics. This widely distributed species has been admirably illustrated by Ferris (I. c., as L. pollicipes). It can easily be recognized from the 4 preceding species by the larger body size, larger basal bare stripe of cell 1m, more strongly asymmetrical tarsus 1, longer segment 1 of tarsus 3, absence of ♀ lateite 7 and presence of spine-like setae on ♀ lateite 3. In Ferris’ (1927c) figure, the tarsus 1 was drawn as if the inner rather than outer apical lobes of segments 3-4 were abnormally lengthened.

♀. Color fairly dark, wing weakly fuscous. Head: Occipital margin almost straight; vertical bristle 2/3 as long as notopleural bristle; postvertex fairly short. Face moderately wide, narrowed anteriorly. Frons proper short, widely notched at middle; frontal process (fig. 6) 1/2 as long as palpus (fig. 2), in profile gently decurved, apically acute or subacute. Vibrissal process in profile normal, shorter than wide at base, apically blunt or subacute. Gula posteriorly spined. Thorax: Mesonotum 44×38; prescutum densely strongly striate all over; scutellum 11×33, posterolaterally rounded, posteriorly distinctly convex. Metapleurotergal callus with 3-4 spines. Prosternum (fig. 7) poorly sclerotized. Metasternal process poorly developed. Wing
(fig. 68) 5.1–5.7 mm long; setulae covering entirety of cells 2r and 3r; 2a entirely, c, sc, 1r, lbc and 2be basally and 2m; ia posteriorly bare; lm basally with fairly large bare stripe. **Legs:** Femur 1 (fig. 8) strongly swollen, basal part of its anterior surface rather evenly setose; anterior surface of femur 2 with 6+: short spines, its basal part with very fine often pale setae. Tibia 3 as in fig. 11. Tarsal spines 1.1.1.0/2.1.1.0/3.2.1.1; tarsomeres 3 and 4 (fig. 10) of foreleg with outer apical lobes much longer than inner ones; tarsomere 1 of hindleg 19×7, subequal in length to 2+3+4, hardly longer than 5; tarsomeres 2–4 of same leg asymmetrical. **Abdomen** (fig. 101) with moderately long and robust setae; dorsal striolate area with scattered ones; ventral setae practically uniform in length and robustness, those fencing urogenital area longer, more robust and generally darker than elsewhere. Tergite 3 fairly narrow; tergite 6 posteriorly concavely curved, with 4–5 pairs of bristles. Laterite 3 poorly sclerotized; 7 undefinable. Postgenital plate with few setae near anterior margin.

♂. Similar. Setae on laterite 3 largely spine-like and nearly as robust as posterior spines of laterite 2, much longer and more robust than setae near spiracles 4 and 5. Aedeagus (fig. 102) fairly short, apical part almost straight; paramere apically blunt and gently decurved. Postgenital plate not bilobed, apically setose.

**Longipalpis Group**

*Distribution.* Palaeotropical; 12 species and subspecies: 8 in Oriental and 4 in Ethiopian Region; nearly half of them are fairly widely distributed.

*Host Relationships.* Two species monoxenous, all others oligoxenous. Preferred hosts are Accipitridae, Phasianidae, Bucerotidae, Sturnidae and Corvidae.

*Diagnosis.* Tarsomeres 3 and 4 of foreleg usually symmetrical; metasternal process strongly produced; frontal process (in dorsal view) and scutellum normal for the subgenus; vertical and some other major bristles often shortened; apical cells of wings often with narrow bare stripe along their apical margin; aedeagus sometimes apically hook-like. Sexual dimorphism strong, both in abdominal chaetotaxy and leg armature.

*Affinities.* Closely related to but obviously more specialized than the preceding group. Similar to the Hirsuta and Meda groups in bearing peg-like spines underneath ♂ tibia 2 in certain species, and similar to the genus *Pseudolynchia* in having well developed frontal, vibrissal and metasternal processes. As mentioned above, both similarities are very likely secondary convergence rather than of phylogenetic significance. In my previous scheme (1963), *dioxyrhina* and its relatives were placed under an independent group. Following the discovery of connectant forms, they are combined together with *longipalpis* and then divided into 4 subgroups.

(a) Frontal process in profile broadly rounded; vibrissal area broadly rounded or sharply angular and very slightly projecting; palpus moderately long; wing-setulae extensive, vein R 2+3 normal; metasternal process shorter than wide at base or as long as wide; ♂ abdominal dorsum with only ordinary setae. ♂ unknown. On Phasianidae; 2 species: *humilis, subdentata*.

(b) Frontal process in profile broadly rounded; vibrissal process prominent, strongly projecting; palpus moderately long; apical cells of wing with bare stripe along their apical margin, apical 1/3 of vein R 2+3 as thick as and coalescent with C; metasternal process slightly longer than wide at base, apically acute; ♂ tibia 2 lacking preapical spines; ♂ abdominal dorsum with only ordinary setae; aedeagus apically not hook-like, ♂ post-
genital plate not bilobed. On Bucerotidae; 1 species: *coalescens*.

(c) Frontal and vibrissal processes both acute and projecting in profile; palpus long or very long; wing-setulae extensive, vein R$_{2+3}$ normal; metasternal process shorter than wide at base, apically broadly rounded; ♀ tibia 2 lacking preapical spines; ♀ abdominal dorsum only with ordinary setae; aedeagus not hook-like apically, ♀ postgenital plate not bilobed. On Accipitridae, Sturnidae and Corvidae; 4 species and subspecies: *mecorrhina*, *longipalpis*, *acromialis acromialis*, a. *tuberculata*.

(d) Frontal and vibrissal processes both acute and projecting in profile; apical cells of wing with bare stripe along their apical margin, vein R$_{2+3}$ normal; metasternal process much longer than wide at base, apically acute or subacute; ♀ tibia 2 often with preapical spines; ♀ abdominal dorsum often with patches of very dense spine-like bristles; aedeagus usually hook-like at apex, ♀ postgenital plate bilobed. On Bucerotidae and Corvidae; 5 species: *corvina*, *bicorna*, *spinosa*, *bucerotina*, *dioxyrhina*.

*Icosta* (Icosta) *humilis* Maa, new species


Fig. 103. *Icosta* (Icosta) *humilis* Maa, ♀ abdomen.
Habitats. Western African Subregion (Liberia). Host preference not clear, the only available record is Galliformes: Phasianidae (Francolinus).

Systematics. This and the next species are so closely related that Bequaert considered them conspecific and labeled them under the same manuscript name. The differences enumerated below, being clearly more than individual variation, well justify the recognition of the 2 independent species. The name *humilis* (humble, poor, insignificant) refers to the seemingly simplicity of this species which stands at the very beginning of the Longipalpis group.

♀. Differing from *subdentata* in following points. Lateral areas of abdominal syntergite 1 + 2 dark brown. Head (fig. 62): Occipital margin weakly concave at midpoint; postvertex short, anteriorly slightly produced at middle, with conspicuous pit. Face wider and more weakly convergent forward. Frons proper moderately long, moderately broad; fronal notch more broadly
rounded; frontal process (fig. 6) 1/2 as long as palpus (fig. 3), fairly broad in dorsal view. Vibrissal area broadly rounded. Mesonotum 34X47; laterocentral bristles of prescutum stronger, darker and extending well beyond transverse mesonotal suture, some of them darker and scarcely finer than vertical bristle; scutellum 9X26. Metapleurotergal callus with 3-4 strong spines in single series. Prosternum (fig. 7) ca 3X as wide as long, moderately sclerotized. Metasternal process ca 1/2 as long as wide at base, narrowly rounded at apex. Wing (fig. 75) 4.8 mm long. Setae on anterior surface of femur 1 (fig. 9) longer, finer. Tarsus 1 and tibia 3 as in fig. 10 and 12 respectively. Tarsal spines 1.1.0/2.1.1/(1)/6.2.1.1. Abdominal setae (fig. 103) more uniform in length and robustness; posterior margin of syntergite 1+2 with series of black stiff setae near its lateral ends; tergite 3 ca 3X as wide as long, well sclerotized; laterite 3 weakly definable; tergite 6 with 3± pairs of bristles; lateral fence of urogenital area insignificant, anterior fence formed by fairly long setae. ♂ unknown.

Icosta (Icosta) subdentata Maa, new species Fig. 5-7, 9, 63, 64, 82, 104.


Habitats. Eastern African Subregion (Uganda), submontane. Host preference not clear; the only available records are Galliformes: Phasianidae (Guttera) and Cuculiformes: Musophagidae (Musophaga).

Systematics. This is another anomalous species and can be distinguished easily from all its congeners by the strongly developed metasternal process, sub-bilobed vibrissal area in combination with broadly rounded frontal process. The last character is shared in this subgenus only by coalescens, recessa and humilis of tropical Africa and wenzeli of the Philippines which have angular or broadly rounded vibrissal areas and not any or hardly any developed metasternal process. In size and color pattern, it is superficially similar to plana. And among the Ethiopian species, it bears nearly same color pattern, thoracic chaetotaxy and extent of wing-setulae as minor which is much smaller and belongs to a different subgenus. The type bears Bequaert's manuscript name which means narrow wing.

♀. Color very pale, uniformly yellowish brown, darkest on claws (black) and on last tarsomeres and abdominal syntergite 1+2 (brown). Wing very weakly stained with yellowish, anterior veins yellowish brown, not darker than legs. Head (fig. 63): Occipital margin very weakly curved at both ends, otherwise straight; vertical bristle as long as and hardly finer than notopleural bristle; postvertex fairly short, anteriorly bilobed. Face fairly wide, narrowed forward. Frons proper long, narrow; frontal notch narrow, rounded; frontal process (fig. 6) ca 1/3 as long as palpus (fig. 5), narrow in dorsal view, very broadly rounded in lateral view. Vibrissal area sharply angular and slightly projecting, not well defined from frontal process except in pigmentation and sclerotization, its lower margin forming very insignificant preapical lobe which is observable only in anterolateral view. Gula posteriorly with pale strong setae. Thorax (fig. 64): Mesonotum 32X45; prescutum finely feebly striated all over, laterocentral bristles all pale, quite fine, reaching transverse mesonotal suture; scutellum 8.5X22, posterior margin evenly convex. Metapleurotergal callus with 5-7 strong spines in 2 series. Prosternum (fig. 7) transversely linear, weakly sclerotized, with 4-5 pairs of soft setae. Metasternal process almost as long as wide at base, acute at apex. Wing (fig. 82) 4.8 mm long; setulae extensive, cell lm+1a with small bare area at extreme base, otherwise uniformly setulose, 2a practically entirely bare, with a few setulae narrowly along apical section of vein 2A; cell 2bc only 1/3 as long as lbc. Legs: Femur 1 (fig. 9) moderately swollen, anterior surface with 3-4 spines, and its basal part rather evenly covered with sparse suberect setae; anterior surface of femur
2 with 2-3 weak spines, with small bare area at a point of basal 1/3. Tarsal spines 1.0.1.0/2.1, 1.0/4.2.1.1; tarsomeres 3 and 4 of foreleg symmetrical; tarsomere 1 of hindleg 10.5×3.5, distinctly longer than 2+3+4 and than 5; tarsomere 2 of same leg slightly shorter than wide, 3 and 4 slightly asymmetrical. *Abdomen*(fig. 104) with pale fine setae on median area and darker stronger ones on lateral area including that of syntergite 1+2; posterior margin of syntergite 1+2 with only pale soft setae; tergite 3 transversely linear, poorly sclerotized; laterite 3 not definable; dorsal striolate area with few fine setae in 3 transverse series on each side; tergite 6 large, with 7 pairs of bristles, its hind margin concavely curved; lateral fence of urogenital area formed by long strong setae, anterior fence insignificant; no laterite 7. $\exists$ unknown.

**Icosta (Icosta) coalescens (Maa)** Fig. 2, 6-8, 10, 11, 69.

*Lynchia coalescens* Maa, 1964: 98, fig. 23-27, $\exists$. Type: $\exists$ (CNHM), ex (?) bird, Gabon.

**Material.** 3$\delta\varphi$, 1$\varphi$. CAMEROONS: 1$\varphi$ (MCZ), Sangmelina, VI.1932, Good. CONGO: 1$\varphi$ (MCZ), Luputa, Lomami, sur calao [hornbill], XI.1934, Bouvier. UGANDA: 1$\delta$, 1$\varphi$ (MCZ), Budongo Forest, ex Bycanistes subcilindricus, V.1936, Meinertzhagen $\exists$ 7676.

**Habitat.** W. and E. African Subregions, at present known from Cameroons, Gabon, Congo and Uganda. By implication of host relationship of related forms, *coalescens* probably breeds on Coraciiformes: Bucerotidae (*Bycanistes*). The holotype was labeled “on shirt, may have come from a hornbill held in my hand”.

**Systematics.** As pointed out in the original description, *coalescens* can be recognized readily from any of its congeners by the abnormal vein R$_{2+3}$ of which the apical 1/2 is unusually thickened and coalescent with C. The frontal process in lateral view is also unusual in being broadly membranous (and pale colored) before meeting vibrissal area. The marginal bare stripe of apical cells of the wing is common to that found in *dioxyrhina* and other Oriental relatives. Femur 1 is moderately swollen, anterior surface bearing 3-4 heavy spines, and its basal part is evenly covered with suberect setae; anterior surface of femur 2 almost uniformly setose, with 1 spine near midlength. Tarsal spines are similar in number in both sexes, but segment 2 of tarsus 1 may have 2 spines in $\varphi$. The $\varphi$ abdominal chaetotaxy differs very little from the $\exists$; the $\exists$ laterite 7 is roundish, well developed, and bears $4\pm$ bristles and few setae. In the original description, tergite 3 was stated to be present and tergite 6 to be posteriorly emarginate. By oversight, they were not so drawn in the accompanying figures. Since the frontal process (fig. 6), femur 1 (fig. 8) and abdominal chaetotaxy are fairly generalized and the sexual dimorphism is weak, *coalescens* is placed here near the beginning of the group; notwithstanding, the venation is highly specialized. The palpus, prosternum, fore tarsus, hind tibia and wing are as in fig. 2, 7, 10, 11 and 69, respectively.

**Icosta (Icosta) meconrhina (Maa)** Fig. 4, 6, 7, 10, 12, 78.

*Lynchia meconrhina* Maa, 1964: 95, fig. 16-22, $\varphi$ $\exists$. Type: $\varphi$ (CNHM), ex Cassinaetus africanus, Gabon.

(?*) *L. dioxyrhina*: Falcoz 1929: 47 (Grande Comore Is.).

**Material.** 18$\delta\varphi$, 29$\varphi$.

LIBERIA: 1$\delta$ (MCZ), Kakatown, ex Accipiter r. rartlaubi, VIII.1926: 1$\varphi$, 1$\varphi$ (MCZ).
id., Lophoceros [Tockus] fasciatus semifasciatus. 1♂, 1♀ (MCZ), Du R., Camp #3, ex Ceratogymna elata, VIII.1926; 1♂ (MCZ), id., L. f. semifasciatus.

IVORY COAST: 1♀ (MCZ), env. Abidjan, ex Gypohierax angolensis, VII.1883.

CONGO: 1♂ (MCZ), Avakubi, 27°31’E, 1°20’N, ex Astur [Accipiter] tonssenellii #5348, XII.1914, Chapin. 1♀ (MAC), Uvira, ex Criniger zonurus, I.1951, Lambrecht.

ETHIOPIA: 3♀♂ (BMNH), Maraquo, C. Abyssinia, V.1914, Kovacs.

UGANDA: 3♀♂ (MCZ), Kampala, ex Accipiter tachiro sparangensis, coll. Hopkins; 1♂, 2♀♂ (MCZ), id., A. r. rufiventris; 1♀. 6♀♂ (MCZ), id., A. ovampoensis. 2♀♂, 3♀♂ (MCZ), Kinkinzi, Kigezi, ex A. ovampoensis, VII.1940, Hopkins. 1♀ (MCZ), Mpumu, 1912, Duke. 3♀♂, 2♀♂ (BMNH) (1♀ w. fungus on abd.), nr Jinja, bred from nest material of cormorants & little egrets, X.1956, William. 2♀♂, 6♀♂ (MCZ), Toro, ex A. m. melanoleucus, IV & VIII.1940, Hopkins. 1♀ (MCZ), Mt Debasien, ex Circaetus g. gallicus, XII.1933, Loveridge.

ZULULAND: 1♂, 1♀ (MCZ), both w. mites on thorax, Eschew, ex Bycanistes bucinator, XI.1934, de Meillon.

Habitats. Widespread over Ethiopian Region, at present known from Liberia, Ivory Coast, Gabon, Congo, Ethiopia, Uganda and Zululand. Probably breeding on Accipitridae and Bucerotidae, with stray records from Musophagidae and Caprimulgidae. Analysis of available data follows. Falconiformes: Accipitridae 14 (Accipiter 9, Cassinaetus 1, Circaetus 1, Gymnogenys 1, Gypohierax 1); Cuculiformes: Musophagidae (Crinifer) 1; Caprimulgiformes: Caprimulgidae (Caprimulgus) 1; Coraciiformes: Bucerotidae 4 (Bycanistes 1, Ceratogymna 1, Tockus 2).

Systematics. As suggested by the name, mecorrhina is chiefly characterized by the unusually long frontal process (fig. 6). By this outstanding character alone, the species can hardly be mistaken for any of its congeners. The extent of wing-setulae (fig. 78) is somewhat different in the 2 sexes. In △♀, the under surface of cells 3r and 1m has an obscure bare stripe along their apical margin, whereas in ♀♂, those cells often have narrow longitudinal bare stripes rather similar to those found in Ornithomya. The species is rather isolated. Although being placed here near longipalpis and acromialis, it has no close affinities with the 2 latter species. The palpus, head in profile, prosternum, fore tarsus and hind tibia are as in fig. 4, 6, 7, 10 and 12, respectively.

Icosta (Icosta) longipalpis (Macquart) Fig. 3, 6, 7, 10, 12, 63, 64, 77, 105, 106, 143.

Olfersia longipalpis Mcq., 1835: 630. Type lost, ex (?) bird, Java.

O. longirostris Wulp, 1897: 144. Type destroyed, ex (?) bird, Ceylon.

Lynchia majuscula Beq., 1945b: 98, fig. 2-3. ♀. Type: ♀ (MCZ), ex Spilornis cheela spilogaster, Ceylon.

Material. 10♂♂, 36♀♀.

E. PAKISTAN: 1♀ (MCZ), Baramchal, Sylhet, 50 m, ex S. cheela, IV.1958, Paynter.


THAILAND: 2♀♂ (CNHM), Chaiyaphum, Pookhiew, Bantardpoon, ex S. cheela, B 17557, XII.1952, Elbel. 1♀, Chanthaburi, KhaoSoidaotai, ex Ictinaietus malayensis, ±2332, III.1966, Migr. Anim. Path. Surv. 3♀♂, Chiengmai, Doi Inthanon, ex Aquila nipalensis,

MALAYA: 1♂ (BMNH), Selangor, ex “Enggang”, III.1932, Seimund.


Fig. 105-106. *Icosta (Icosta) longipalpis* Meq., Thailand, ♀ abdomen (105) and ♂ genitalia (106).

BORNEO: 1♀, Ranau, Sabah, ex Haliastur indus intermedius, PJ 9466, IX.1960, Kuntz. 1♂, 1♀ (BMNH), Sandakan, Sabah, III.1893, Cator.

PHILIPPINES (Mindanao): 1♂, 3♀, Dapitan Peak, 1720–2320 m, Mt Malindang, Misamis occ., ex Spilornis cheela holospilus, BBM 510, I.1963, Rabor. 1♀, Limot Mati, Davao Prov., Mt Mayo, ex S. cheela holospilus, B 8245, VI.1965, Rabor.

Habitats. Widely spread over western Oriental Region; so far, known from lowland up to 2000 m in Ceylon, E. Pakistan, Burma, Thailand, Malaya, Sumatra, Java, Borneo and Philippines (Mindanao). Obviously breeding on Falconiformes: Accipitridae, particularly the genus Spilornis. Analysis of above given data, Falconiformes: Accipitridae 15 records (Aquila 2, Haliastur 1, Ictinaetus 1, Pernis 1, Spilornis 9, Spizaetus 1); Strigiformes: Strigidae c. Bubo 1. Highest density per infested bird was 1♀, 3♂♀ (BBM 510, ex Spilornis).

Systematics. The only published illustrations known to me of this species were by Bequaert (l.c., as L. majuscula), which were mislabeled as of ♂, rather than ♀ holotype, and in fig. 2B, abdomen, as from both above and below, rather than from above only. As suggested by the names longipalpis, longirostris and majuscula, this species can be easily recognized by the long palpus and large body size. The very extensive wing-setulae is unknown to other species of the subgenus; the metasternal process is short; tarsus 1 practically symmetrical, aedeagus rather short, hardly S-shaped. It has no very close relative.

♀. Color dark, wing fuscous. Head: Occipital margin distinctly concave; vertical bristle 2/3 as long as notopleural bristle; postvertex fairly long. Face wide, almost parallel-sided. Frons proper very short, narrowly notched at middle; frontal process (fig. 6) 1/2 as long as palpus (fig. 3), in profile gently decurved, apically pointed. Palpus ca 5/7 as long as distance between frontal notch and occipital margin. Vibrissal process in profile normal, small, as long as wide at base, apically acute. Gula posteriorly spinose. Thorax: Mesonotum 72 × 100; prescutum densely, strongly striate all over; scutellum 19 × 50, posteroventrally subangular, posteriorly very weakly convex, with median 1/3 of posterior margin almost straight; scutellar bristle very close to posterior margin. Metapleurotergal callus with 4–6 very stout spines and 6–10 black strong setae, latter irregularly arranged and largely lying dorsal to spines. Prosternum (fig. 7) very small, moderately sclerotized, with 1 pair of soft setae. Metasternal process (fig. 143) 1/2 as long as wide at base, broadly rounded. Wing 8.5–9.5 mm long; setulae very extensive, leaving only posterior part of cell 2r bare. Femur 1 moderately swollen, basal part of its anterior surface rather evenly covered with fine suberect setae; anterior surface of femur 2 with small bare area and 2± spines near midlength. Tibia 3 as in fig. 12. Tarsal spines 2.1.1.0/2.1.0.1.0/3.2.1.1; tarsomeres 3–4 (fig. 10) of foreleg with outer apical lobes hardly longer than inner ones; tarsomere 1 of hindleg 33 × 13.5, longer than 2+3+4 and than 5; tarsomeres 2–4 of same leg slightly asymmetrical. Abdomen (fig. 105) rather uniformly covered with moderately long and fine setae; dorsal striolate area unevenly setose; ventral setae on lateral area slightly more robust than on median area, those fencing urogenital area markedly longer and more robust than elsewhere. Tergite 3 rather wide; tergite 6 shallowly concave at anterior and posterior margins, with 7± pairs of bristles. Laterite 3 well sclerotized ventrally, its setae as long and fine as those near spiracles 4 and 5; laterite 7 small, roundish, with 2 bristles and 2–4 setae. Postgenital plate extensively setose.

♂. Similar. Foreleg with 1.0.1.0 tarsal spines; tarsomeres 1 and 5 of hindleg equal in length. Setae on laterite 3 distinctly more robust than near spiracles 4 and 5. Aedeagus (fig. 106) fairly
short, strongly sclerotized, hardly decurved at apical part; paramere short, apical part decurved and pointed. Postgenital plate long, broadly rounded (not bilobed), with many setae on and near apical and apicolateral margins.

**Icosta (Icosta) acromialis acromialis** (Speiser)  
Fig. 2, 6–8, 10, 11, 62, 65, 107, 109.

**Olfersia acromialis** Speis., 1904d: 386. Type destroyed, ex (?) bird, NE New Guinea; neotype ♂ (BISHOP 7590), ex *Mino dumontii*, N New Guinea.

Material. 8♂♂, 25♀♀.

NW NEW GUINEA: 1♀, Vogelkop, Kebar Valley, 550 m, ex *Mino dumontii*, BBM 749, I.1962, Quate.
NE NEW GUINEA: Neotype ♂, Finschhafen, ex *M. dumontii*, BBM 27648, IV.1963, Clissold. 1♂, 1♀, Karimui, 1100 m, ex bird BBM 20066, VII.1963, Sedlacek.
SE NEW GUINEA: 1♀, Ahola, ex *Aplonis* sp. BBM 29878, X.1963, Clissold. 1♀,

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Fig. 107–109. *Icosta (Icosta) acromialis acromialis* Speis., New Britain (♀) and Solomon Is. (♂), ♀ abdomen (107) and ♂ genitalia (109); *I. (I.) acr. tuberculata* Ferr., Philippines, ♂ genitalia (108).

NEW BRITAIN: 3♂♀, 4♀♀, Gaulim, ex *Corvus orru*, BBM 20691, X.1962, Clissold.


**Habitats.** Papuan Subregion, at present known from New Guinea, New Britain and Solomon Is., lowland, up to 1100 m. Probably breeding on Corvidae and Sturnidae. Breakdown of above given data, Passeriformes: Corvidae (Corvus) 9 records; Sturnidae 10 (*Aplonis* 3, *Mino* 7). Highest density per infested bird was 3♂♀, 4♀♀ (BBM 20691, ex *Corvus*) in New Britain.

**Systematics.** This fairly widely spread species is so far known from the original description which reads:


Specimens here referred to *acromialis* fit the original description very well, and I have no doubts about their identity. The antennal appendages were said by Speiser to be pale on the inner side and the frons proper to be without dimple (Grüben), but both are inconstant characters. The scutellum was said to be “fast geradlinig abgestutzt”, this is apparently an exaggeration since, if so (as in *jactatrix* and *elbeli*), the scutellum would not be “aber doch noch ziemlich lang.” The anal field of wing (cell 2a) was said to be paler which is obviously a result of the absence of setulae in that particular area. The collection data of the neotype (designated Maa 1963: 12) is corrected here.

*Acrornialis* and *tuberculata* are so similar to each other in structure and in host relationships that they must be considered conspecific. They apparently serve as connecting links of the Plana and Longipalpis groups. Their tarsi are distinctly asymmetrical and metasternal process moderately developed. Therefore, they can be placed in either group. But the aedeagi are elongate and apically hook-like. On the strength of this character,
they are here assigned to the Longipalpis group within which they stand closest to corvina although their structure and host relationships are less specialized than in the latter species. The supposedly close affinities of acromialis to rufiventris Big. (=fusca Mcq.) and angustifrons Wulp as emphasized by Speiser are nothing but superficial similarities.

♀. Color dark, wing weakly fuscous. Head (fig. 62): Occipital margin very weakly convex in general outline, hardly concave at median section; vertical bristle 2/3 as long as notopleural bristle; postvertex moderately short. Face moderately wide, parallel-sided in dorsal view of insect, very weakly narrowed anteriorly in front view of head. Frons proper short, widely notched at middle; frontal process (fig. 6) 2/3 as long as palpus (fig. 2), in profile very broad, rather strongly decurved, apically narrowly rounded. Vibration process in profile normal, triangular, as long as or slightly shorter than wide at base. Gula posteriorly spinose. Thorax: Mesonotum 41×52; prescutum densely strongly striate all over; scutellum 12×29, posterolaterally almost rounded, posteriorly distinctly convex. Metapleurotergal callus with 3-4 spines. Prosternum (fig. 7) weakly sclerotized, with 2 pairs of soft setae. Metasternal process moderately developed, 1/2 as long as wide at base. Wing (fig. 65) 4.6-5.2 mm long; setulae covering entire membrane except cell 2a. Femur 1 (fig. 8) strongly swollen, basal part of its anterior surface unevenly covered with spinules; anterior surface of femur 2 with 6± long slender spines, its basal part largely bare. Tibia 3 as in fig 11. Tarsal spines 1.0.0.0/2.1.0/2.2.1.1; tarsomeres 3-4 (fig. 10) of foreleg with outer apical lobes distinctly longer than inner ones; tarsomere 1 of hindleg 14×8; nearly as long as 2+3 and slightly shorter than 5; tarsomeres 2-4 of same leg all asymmetrical. Abdomen (fig. 107) with moderately long setae; dorsal striolate area with few scattered fine short setae; membrane between tergite 3 and spiracle 3 often with 1-2 setae longer (but not noticeably stouter) than neighboring ones; setae on lateral area distinctly stouter and with much larger basal papillae than on median ventral area, those fencing urogenital area scarcely more robust. Tergite 3 narrow, tergite 6 with 5-7 pairs of bristles. Laterite 3 well sclerotized, bearing spine-like setae; laterite 7 small, with single bristle and 1-2 setae. Postgenital plate with 10± pairs of short setae near anterior margin.

♂. Similar. Tergite 3 larger; laterite 3 hardly sclerotized but easily recognizable by presence of spines, which are markedly longer and stouter than setae near spiracles 4 and 5. Aedeagus (fig. 109) long, distinctly S-shaped, apically decurved and hook-like. Postgenital plate not bifurcated, with few setae on apical margin.

Icosta (Icosta) acromialis tuberculata (Ferris) Fig. 2, 6, 7, 11, 108.

Lynchia tuberculata Ferr., 1927c: 224, fig. 12-13, ♀. Type: ♀ (UCB), ex Corvus pusillus, Palawan.


Habitats. Chiefly Philippine Subregion; at present, known from lowlands in Mindanao, and Culion Islands, spreading southward to Palawan which belongs to Malaysian Subregion. Obviously breeding on Passeriformes: Corvidae (Corvus) and Sturnidae (Gracula), with one stray record from Psittacidae (Prioniturus).

Systematics. Tuberculata is so far known from the unique type (♀) and original description. It is so closely similar in structure and host preference to acromialis that the 2
forms are here considered conspecific. The palpus, prosternum and hind tibia are as in fig. 2, 7 and 11, respectively.

♀ (undescribed). Differing from nominotypical *acromialis* in following points. Frontal process (fig. 6) 4/5 as long as palpus, in profile not very broad, gently decurved and apically subacute. Vibrissal process slightly shorter than wide at base. Abdominal dorsum mesad to each of spiracles 3, 4 and 5 with 3-4 unusually strong setae which are several times as long and robust as neighboring ones; lateral setae on venter much longer and with much larger basal papillae; setae fencing urogenital area stouter and more numerous.

♂. Tarsomere 1 of midleg with single spine. Laterite 3 with setae not longer, or hardly so, but stouter than those near spiracles 4 and 5. Aedeagus (fig. 108) broader and less curved, paramere shorter. Other characters as in typical ♀ *acromialis*.

*Icosta (Icosta) corvina* Maa, new species

**Fig. 2, 6-8, 10, 11, 62, 70, 110, 111.**

**MATERIAL.** 4♂♀, 6♂♂. Holotype: ♀ (CNHM); allotype (Bishop 7591) and 4 paratypes, (Bishop); 1 paratype each, (BMNH, MCZ and VRC).

CEYLON: Paratype ♀ (BMNH), Uva Hills, Namunukula, Tonacombe, ex (?) crow, IX.1952, Phillips.


BURMA: Paratype ♀ (MCZ), Myitkyina, ex *C. macrorhynchos*, IV.1945, Stager & Jelldson.


**Habitats.** Indian and Indo-Chinese Subregions; at present, known from Ceylon, Peninsular India, Burma and Thailand, lowland, up to 500 m. Possibly monoxenous on Passeriformes: *Corvidae: Corvus macrorhynchos* Wagler, which is very widely distributed over Oriental Region.

**Systematics.** This species is closely related to *bucrotina* and *spinosa* and can easily be distinguished from them by smaller size, shorter postvertex, shorter thoracic bristles, straight aedeagus and different abdominal chaetotaxy. In the presence of preapical spines on ♀ tibia 2, *corvina* also shows affinities to *dioxyrhina*.

♀. **Color** dark, wing weakly fuscous. **Head** (fig. 62): Occipital margin distinctly concave; vertical bristle 1/2 as long as notopleural bristle; postvertex short. Face wide, almost parallel-sided. Frons proper very short, rather narrowly notched at middle; frontal process (fig. 6) as long as palpus (fig. 2), in profile gently decurved, apically pointed. Vibrissal area in profile normal, slightly shorter than wide at base, apically blunt or subtruncate. Gula posteriorly with fine black setae.

**Thorax:** Mesonotum 49.70; major thoracic bristles all fairly short, scutellar weaker and paler than others; prescutum densely strongly striate all over. Scutellum 15×40; posterolaterally subangular, posteriorly gently convex. Metapleurotergal callus with 4± spines. Prosternum (fig. 7) poorly sclerotized, with 1 pair of soft setae. Metasternal process small, 1/2 longer than wide at base. **Wing** (fig. 70) 5.5-5.9 mm long; setulae covering all cells except posterior 1/3 of 2m+1a and entirety of 2a; apical margin of ♀ (part), 1m and 2m+1a uniformly bare on upper surface, more or less irregularly bare on lower surfaces. Femur 1 (fig. 8) strongly swollen, basal part of its anterior surface evenly covered with setae; anterior surface of femur 2 with 2± spines, its basal area largely bare. Tibia 3 as in fig. 11. Tarsal spines 1.1.1.
Fig. 110-111. *Icosta (Icosta) corvina* Maa, Thailand: 110, ♀ abdomen; 111, ♂ abdomen including genitalia.
0/2.1.0/3.2.1.1; tarsomeres 3–4 (fig. 10) of foreleg with outer apical lobes hardly longer than inner; tarsomere 1 of hindleg 13X6.5, hardly longer than 5, much shorter than 2+3+4 which are distinctly asymmetrical. *Abdomen* (fig. 110) with short, rather uniform setae; setae on lateral area stouter and with much larger basal papillae: membranous area between tergite 3 and spiracle 3 with 4–8 long stout setae. Ventral setae on median area longer, those lying lateral to urogenital area much longer and stouter than elsewhere on abdominal membrane. Tergite 3 wide, tergite 6 bearing 4–5 pairs of bristles. Laterite 3 well sclerotized, its dorsum similarly setose as neighboring membranous area, venter sparsely setose; laterite 7 small, with 1 bristle. Postgenital plate with scattered minute setae.

* Icosta (Icosta) bicorna (Ferris) Fig. 2, 6, 7, 10, 11, 66, 112, 113.

**Lynchia bicorna** Ferr., 1927c: 230, fig. 18, 19, 3. Type: 3 (UCB), ex *Penelopides manilae*, Luzon.

**Material**. 2♂♂, 3♀♀. PHILIPPINES: 1♂, Canon, Mutya, Mt Malindang, 1000 m, Mindanao, ex *Buceros hydrocorax*, XII.1961, Rabor & Gonzales; 1♀, id., *Aceros l. leuccephalus*. 1♂, Limot Mati, Davao Prov., Mt Mayo, Mindanao, ex *Lonchura malacca jagori*, B 8269, VI.1965, Rabor. 1♀, Santa Cruz, Mahaplag, Leyte, ex *Eurystomus orientalis cyanocollis*, B 1883, VI.1964, Rabor. 1♂ (MCZ), Catbalogan, Samar, det. Bequaert as "L. dioxyrhina Speis. = bicorna Ferr."

**Habits.** Philippines Subregion; at present known from lowland up to 1000 m in Luzon, Samar, Leyte and Mindanao. Apparently breeding on Coraciiformes: Bucerotidae (*Aceros, Buceros, Penelopides*); the odd records ex Coraciidae (*Eurystomus*) and Passeriformes: Ploceidae (*Lonchura*) were strays.

**Systematics.** Apparently *bicorna* represents the most generalized form of the *Icosta* species parasitic on Oriental hornbills. Its vibrissal process and vein R_2_+3 are normal, ♂ abdomen lacks modified setae on membrane between tergite 3 and spiracle 3 and on laterite 3, and ♀ tibia 2 lacks preapical spines. In the shape of aedeagus, it is similar to *dioxyrhina* and *corvina*; and in the extent of wing-setulae, similar to *buceroita*. In the original description, the venter of ♀ abdomen was drawn as if largely bare. This is not true (see fig. 113).

♀ (undescribed). **Color** dark, wing weakly fuscous. **Head**: Occipital margin distinctly concave; vertical bristle 1/2 as long as notopleural bristle; postvertex short. Face rather narrow, narrowed anteriorly. Frons proper very short, rather narrowly notched at middle; frontal process (fig. 6) 1/3 longer than palpus (fig. 2), in profile gently decurved, apically pointed. Vibrissal process in profile normal, slightly longer than wide at base, apically truncate. Gula posteriorly with pale fine setae. **Thorax**: Mesonotum 48X66; prescutum densely strongly striate all over. Scutellum 15X37, posterolaterally subangular, posteriorly distinctly convex. Metapleurotergal callus with 3 spines. **Wing** (fig. 66) 6 mm long; setulae more extensive than in ♂, cell lm with small bare area on apical margin, otherwise entirely setulose; 2m+1a bare at posterior 2/3 and on apical margin.
Fig. 112-113. *Icosta (Icosta) bicorna* Ferr.: 112, ♀ abdomen: 113, ♂ abdomen including genitalia.
Femur 1 strongly swollen, basal part of its anterior surface bare on upper half, covered with spinules on lower half; anterior surface of femur 2 as in corvina. Tibia 3 as in fig. 11. Tarsal spines 1.1.1.0/1.1.1.0/3.2.1.1; tarsomeres 3-4 (fig. 10) of foreleg symmetrical; tarsomere 1 of hindleg 13×6, slightly longer than 5 but much shorter than 2+3+4; tarsomeres 2-3 of same leg asymmetrical, 4 hardly so. Abdomen (fig. 112) with short setae; setae on lateral area stouter and with much larger basal papillae, those on dorsal striolate area rather scattered, no modified setae between tergite 3 and spiracle 3; ventral setae on median area longer, those fencing urogenital area much longer and stronger. Tergite 3 wide; tergite 6 with 4± pairs of bristles. Laterite 3 weakly sclerotized, similarly setose as neighboring area, ventrally extensively bare; laterite 7 small, bearing single bristle. Postgenital plate with scattered minute setae.

♂. Similar. Tibia 2 lacking preapical spines. Tarsal spines 1.1.1.0/2.1.1.0/4.2.1.1. Laterite 2 (fig. 113) with rather stout short spines, laterite 3 ventrally with similar spines. Aedeagus (fig. 113) long, distinctly S-shaped, apically hook-like; paramere moderately long, apically strongly decurved. Postgenital plate bilobed, with few setae on apical margin.

**Icosta (Icosta) spinosa** Maa, new species Fig. 10, 12, 63, 64, 81, 114.

**Material.** 1♂, 2♀. Holotype ♂ (BISHOP 7592) and allotype ♂ (BISHOP), paratype (CNHM). LAOS: Holotype ♀, allotype ♂, Thateng, Bolovens Plateau, ex Anthracoceros albirostris, R 70427, VII.1960, Leech. THAILAND: 1♀ (CNHM), Chaiyaphum, Pookhiew, Bamnapoo, ex *A. malabaricus*, B 17554, XII.1952, Elbel.
Habitats. Indo-Chinese Subregion, at present known from Thailand and Laos, lowland; obviously breeding on Coraciiformes: Bucerotidae, perhaps monoxenous on Anthracoceros.

Systematics. Closely related to bucerotina, being chiefly characterized by strong spines on laterite 3 in both sexes and slightly more extensive wing-setulae. The palpi are relatively shorter. Other relatives are bicornu and corvina from which spinosa can be distinguished by similar characters and by body size, \( \partial \) preapical tibial spines and relative size of basal papillae of abdominal setae.

\( \partial \). Color dark, wing very weakly fuscous. Head (fig. 63): Occipital margin weakly concave; vertical bristle less than 1/2 as long as notopleural bristle; postvertex fairly long. Face wide, almost parallel-sided. Frons proper very short, rather narrowly notched at middle: frontal process in profile gently decurved, apically pointed. Palpus as long as frontal process. Vibrissal process in profile normal, slightly longer than width at base, apically blunt. Gula posteriorly with fine pale setae and 1-2 black spines. Thorax (fig. 64): Mesonotum 55X74; prescutum densely strongly striate all over. Scutellum 16X42, posterolaterally subangular, posteriorly gently convex. Metapleurotergal callus with 2 spines. Prosternum poorly sclerotized, with 1 pair of soft setae. Meseternal process large, distinctly longer than wide at base, apically narrower than in bucerotina. Wing (fig. 81) 6.1-6.4 mm long; setulae covering all cells except posterior 1/3 of 2m+1a and entirety of 2a, with narrow bare stripe on apical margin (upper surface only) of 3r (part), 1m and 2m+1a. Tibia 3 as in fig. 12. Tarsal spines 1.1.0.0/2.1.0.0/3.2.1. 1; tarsomeres 3-4 (fig. 10) of foreleg symmetrical; tarsomere 1 of hindleg 14X7, hardly longer than 5 but much shorter than 2+3+4 which are apically symmetrical. Abdomen (fig. 114) rather uniformly covered with short setae; membrane between tergite 3 and spiracles 3 with 3-4 stout spines. Tergite 3 wide; tergite 6 bearing 5± pairs of bristles; setae on median part of ventral membrane long; those fencing urogenital area very long and robust. Laterite 3 hardly sclerotized, ventrally with 10-11 stout spines which are slightly shorter than those lying between tergite 3 and spiracle 3; laterite 7 small, with 1 bristle. Postgenital plate with 10± setulae.

\( \partial \). Similar. Scutellum as in \( \partial \) bucerotina, slightly longer and posteromedially flattened. Wing-setulae less extensive, cell 3r rather broadly bare along posterior margin, 1m narrowly setulose along basal 1/3 of anterior and posterior margins and with small setulose patches on apical margin, 2m+1a with subintertadial setulose patch along basal 1/2 of anterior margin. Tibia 2 with similar preapical spines as in \( \partial \) bucerotina. Laterite 3 with heavy spines which are in average 3X as long as setae surrounding spiracles 4-5; no modified setae between tergite 3 and spiracle 3. Genitalia (fig. 114) closely similar to that of bucerotina, a little more slender in outline.

Icosta (Icosta) bucerotina Maa, new species Fig. 2, 6, 7, 11, 62, 64, 67, 115, 116.

Material. 5\( \partial \), 11\( \partial \). Holotype \( \varphi \) (BISHOP 7593), allotype \( \varphi \) and most paratypes (BISHOP): 1 paratype (CNHM).

Thailand: 2\( \varphi \), 2\( \varphi \) (1\( \varphi \) w. fungus) incl. holo- and allotypes, Phattalung, Nawaong ex Anorrhinus galeritus carinatus, RE 7128, III.1963, Wanit & Wichit. 2\( \varphi \), 2\( \varphi \) (1\( \varphi \) w. fungus), Trang, Muang Khoachong, ex Berenicornis comatus, WS 189, IV.1963, Wanit. 4\( \varphi \), Ranong, Kaope, Thungka, ex Hyticerus plicatus subruficollis, RE 7043, I.1963, Wanit & Wichit. 1\( \varphi \) w. mite on abd., Satun, Muang Thungnui, ex Anthracoceros malabaricus leucogaster, RE 6279, VII.1962, Wanit & Wichit. 1\( \varphi \), 1\( \varphi \), Phangnga, Takuapa, ex bird #WS 787, II.1964, Wanit & Wichit.

Borneo: Paratype \( \varphi \) (CNHM 211705), Sapagaya, Sandakan Distr., Sabah, ex Spizaeus sp280, VII.1950, Inger & Davis.
Habitats. Thailand, lowlands, obviously breeding on Coraciiformes: Bucerotidae (Anorhinus, Anthracoceros, Berenicornis, Rhyticeros). The single ♀ from Borneo ex Spizaetus is possibly a straggler, or a mislabeling. Highest density per infested bird was 4 flies (RE 7043, 7128 ex Rhyticeros and Anorhinus, respectively).

Systematics. This species is related to corvina on one hand, and to bicorna, spinosa and dioxyrhina on another. From those, it can be recognized by the long palpus, narrower face, less extensive wing-setulae, and different abdominal chaetotaxy.

♀. Color dark, wing fuscous. Head (fig. 62): Occipital margin distinctly concave; vertical bristle 1/2 as long as notopleural bristle; postvertex fairly long. Face narrow, almost parallel-sided. Frons proper very short, rather narrowly notched at middle; frontal process (fig. 6) in profile gently decurved, apically pointed. Palpus (fig. 2) 1/2 longer than frontal process, slightly longer than mediovertex. Vibrissal process in profile normal, slightly longer than width at base, apically blunt or subtruncate. Gula posteriorly with pale or dull fine setae. Thorax: Mesonotum 59×79; major thoracic bristles normal; prescutum densely strongly striate all over. Scutellum 17×44; posterolaterally subangular, posteriorly distinctly convex. Metapleurotergal callus with 4-6 spines. Prosterna (fig. 7) weakly scleritized, with 1 pair of soft setae. Meta-
sternal process large, distinctly longer than width at base, apically curved mesad. Wing (fig. 67) 6.2–6.6 mm long; setulae not extensive, posteroapical 1/3 of cell 1m bare; 2m+1a only with short narrow setulose stripe along basal 1/2 of vein M2+4, elsewhere bare. Femora 1 and 2 similar to that of bicorna. Tibia 3 as in fig. 11. Tarsal spines 1.1.1.0/2.1.1.0/3.2.1.1; tarsomeres 3–4 of foreleg symmetrical; tarsomere 1 of hindleg 14×7, as long as 5, much shorter than 2+3+4 which are distinctly asymmetrical. Abdomen (fig. 115) with short and rather uniform setae; setae on lateral area stouter and with larger (less large than in C corvina) basal papillae; membranous area between tergite 3 and spiracles 3 with conspicuous patch of 5–10 long, very robust setae; ventral setae on median area slightly longer and more robust, those lying anterolateral to urogenital area much longer and stouter. Tergite 3 wide, tergite 6 bearing 4± pairs of bristles. Laterite 3 not definable, or hardly so, its setae longer, stouter than those of neighboring area; laterite 7 small, bearing single bristle. Postgenital plate with scattered minute setae.

♂. Similar. Wing-setulae forming short narrow stripes along anterobasal margin of 1m and 2m+1a, otherwise those 2 cells bare. Tibia 2 ventrally with series of short pointed preapical spines. Tergite 6 bearing 3–4 pairs of bristles. Aedeagus (fig. 116) long, distinctly S-shaped, apically slightly hook-like; paramere long, apical part strongly decurved. Postgenital plate long, bilobed, with few setae on apical margin.

Icosta (Icosta) dioxyrhina (Speiser) Fig. 3, 6–8, 10, 11, 62, 72, 117, 118.

Olfersia dioxyrhina Speis., 1904d: 387. Type destroyed, ex Rhyticeros plicatus, NE New Guinea; neotype ♀ (BISHOP 7594), here designated, ex Rh. plicatus, NE New Guinea.

Material. 6♂♂, 8♀♀.

NW NEW GUINEA: 2♂♂, Vogelkop, Kebar Valley, 550 m, ex Rh. plicatus, BBM 832, 835, I.1962, Quate; 1♀, id., no host record. 1♂, 2♀♀, Oransbari, NW of Geelvink Bay, 3m, ex Rh. plicatus, BBM 22293, I–II.1963, Thompson & Richards. NE NEW GUINEA: Neotype ♂, Finschhafen, ex "kokomo" [Rh. plicatus], I.1963, Shanahan.

NEW BRITAIN: 1♀, seriously damaged, Gaulim, ex Ducula finschii, BBM 20877, XI.1962, Clissold. 1♂, Mt Sinewet, ex "kokomo", BBM 20767, XI.1962, Clissold.

SOLOMON IS.: 1♂, 4♀♀, Toumea, Fauro, Guadalcanal, 10 m, ex Rhyticeros plicatus, BBM 23806, 23807, IV.1964, Temple.

Habitats. Papuan Subregion, lowlands; so far, known from New Guinea, New Britain and Solomon Is. Obviously breeding on Coraciiformes: Bucerotidae: Rhyticeros plicatus, the only hornbill occurring in those countries. Highest density per infested bird was 4 flies (BBM 23806). The single record of a seriously damaged ♂ ex Columbiformes: Columbidae (Ducula) is apparently a result of contamination. As pointed out previously (Maa 1964: 100), the Grande Comore (in Mozambique Channel) record of dioxyrhina by Falcoz (1929: 47) is certainly erroneous and probably referable to mecorrhina. The Borneo record by Schuurmans Stekhoven (1941 Bull. Mus. Hist. Nat. Belg. 17 (66): 8) is erroneous, too.

Systematics. This is a very distinct species and can easily be distinguished from all other Oriental species by the broad bare stripe on apical margin of cells 3r, 1m and 2m+1a and by very strong spines on femora 1 and 2. Bequaert's (1953a: 271) suggestion of its possible conspecificity with bicorna was apparently guesswork based upon the coincidence of host preference in these 2 species. The species was so far known only from
Fig. 117-118. *Icosta (leosta) dioxyrhina* Speis., New Guinea, ♀ abdomen (117) and ♂ genitalia (118).

the original description.

♀. *Color* very dark, wing fuscous. *Head* (fig. 62): Occipital margin weakly concave; vertical bristle 2/3 as long as notopleural bristle, unusually robust; postvertex fairly long. Face rather narrow, almost parallel-sided. Frons proper very short, narrowly notched at middle; frontal process (fig. 6) as long as palpus (fig. 3), in profile gently decurved, apically pointed. Vibrissal process in profile normal, hardly longer than wide at base, apically blunt or subacute. Gula posteriorly spinose. *Thorax*: Mesonotum 58 × 75; prescutum densely strongly striate all over; scutellum 15 × 41, posterolaterally subangular, posteriorly gently convex. Metapleurotergal callus with 2–3 spines. Prosternum (fig. 7) small, transverse, well sclerotized, with 3–4 pairs of soft setae. Metasternal process narrow, 2 × as long as width as base. *Wing* (fig. 72): 5.8–6.9 mm long; setulae extensive, leaving only entirety of cell 2a and fairly broad stripe along apical margin of 3r, 1m and 2m + 1a bare; this apical stripe is largely bare on both surfaces and partly (at posterior part of cell 3r and anterior part of 1m) bare on upper surface. Femur 1 (fig. 8) strongly swollen, with 9 ± very heavy spines is a row crossing both anterior and dorsal surfaces; basal 1/2 of anterior surface bare on upper 1/2, covered with spinules on lower 1/2; anterior surface of femur 2 with 2 ± very heavy spines, its basal area entirely bare. Tibia
3 as in fig. 11. Tarsal spines 2.1.1.0/2.1.1.0/3.2.1.1; tarsomeres 3-4 (fig. 10) of foreleg symmetrical; tarsomere 1 of hindleg 13×7, hardly shorter than 5, as long as 2 ÷5+4 which are distinctly asymmetrical. **Abdomen** (fig. 117) with short and rather uniform setae; setae on lateral area slightly longer, much stouter and with larger basal papillae; membranous area between tergite 3 and spiracle 3 with 3-4 moderately long, robust setae; ventral setae on median area longer, those fending urogenital area longer, stouter. Tergite 3 wide, tergite 6 with 5-6 pairs of bristles. Laterite 3 well sclerotized, similarly setose as neighboring area, ventrally extensively bare; laterite 7 small, roundish, with 2± bristles. Postgenital plate with few minute setae on anterior margin, elsewhere bare.

♀. Similar. Tibia 2 ventrally with series of short pointed preapical spines. Tarsal spines 2.1.1.0/2.1.1.0/3.3.2.2. Setae on laterite 2-3 somewhat spine-like, distinctly stouter than on neighboring area. Aedeagus (fig. 118) rather short, apically obliquely truncate and somewhat axlike; paramere long, apical part rounded, strongly decurved. Postgenital plate with few setae on apical margin.

**Subgenus Ardmoeca** Maa, new subgenus

**Type-species.** *Olfersia ardeae* Mcq., here designated.

**Distribution.** Worldwide; 12 species and subspecies (5 unnamed): 2 (1 endemic) in Oriental, 4 (2 endemic) in Ethiopian, 2 (both non-endemic) in Neotropical, 4 (2 non-endemic, other 2 of doubtful status) in Palaeartic, 3 (2 endemic) in Australian and 3 (all non-endemic) in Nearctic Region. Two of the species are each divisible into 2 subspecies.

**Host Relationships.** All species are oligoxenous on aquatic and semiaquatic birds, viz., Pelecaniformes (Phalacrocoracidae), Ciconiiformes (Ardeidae, perhaps Ciconiidae and Threskiornithidae as well), Gruidae (Rallidae) and Charadriiformes (Charadriidae).

**Diagnosis.** Postvertex laterally in close contact with inner orbit; palpus short, never more than 2X as long as wide. Wing-setulae exceedingly extensive, cell 2a at least setulose along vein 2A. Apical 1/2, or almost entirety of femora 2 and 3 (fig. 147, 148), densely uniformly setose. Aedeagus bulging at extreme base, straight or nearly straight at apical 1/2; ♂ postgenital plate Y-shaped; ♀ pregenital plate often present. Sexual dimorphism strong or moderately strong. Body surface of matured specimens generally pollinose.

**Affinities.** *Ardmoeca* appears to be rather isolated and with only remote affinities toward *Gypoeca* and *Rhyponotum* in general features of head and leg pilosity. The terminalia of both sexes, however, shows some tendency toward that in *Pseudolynchia* and in Minor group (of subgenus *Ornithoponus*), especially when the ♂ postgenital plate and basal bulging of aedeagus are compared. Within the subgenus the various species clearly fall in 2 groups which differ from one another not only in structure (see couplet 1 of the key) but also in host relationships. The group parasitic on Pelecani- and Ciconiiformes may be divided, on the same bases again, into 2 subgroups. In structural peculiarities and sexual dimorphism, the subgroup parasitic on Pelecaniformes (Phalacrocoracidae) surpasses the remainder of the subgenus. The subgeneric name is derived from Greek *ardmos*, a watering place; *oeka*, *oekos*, belong to a house. The following key is admittedly incomplete and artificial. **Massonnati** is doubtfully placed and sp. "F" not included. When structural details of the unnamed forms are better known, the key will need a thorough revision.
Fig. 119-122. *Icosta* (Ardmoeca) species, wings, magnifications varied.

**Key to species and subspecies of *Icosta* (Ardmoeca)**

1. At least apical (inner) 1/3 of cell 2a bare on both surfaces; jugular area simple, not
angular, no ental process (fig. 141); vein 2A with apex lying either much apicad or
much basad to level of rm; mediovertex markedly longer than postvertex, wider
than inner orbit and narrower than eye. Normally breeding on Phalacrocoracidae
and Ardeidae .......................................................... 2

Under surface of cell 2a entirely setulose, bare stripe on upper surface running
narrowly along apical (inner) margin and only about as wide as vein 2A; jugular area
sharply angular or produced into an ental process at each side of labial theca (fig.
142); apex of vein 2A lying just on level of rm; mediovertex less significantly so.
Normally breeding on Rallidae and Charadriidae ........................................... 9

2 (1). Prescutum with laterocentral bristles which are distinctly more robust than neighboring
ordinary setae, reach or extend beyond transverse mesonotal suture and origi­
nate from punctures markedly coarser than those giving rise of neighboring ordi­
nary setae .......................................................... 3

Prescutum (fig. 6) with only short ordinary setae which are almost uniformly fine,
recumbent, and far from reaching transverse mesonotal suture, their originating
punctures uniform or almost uniform in size .................................................. 6

3 (2). Setulose area of cell 2a not wider, or hardly so, than vein 2A, not extending to wing
margin; posterior scutellar margin evenly curved; ♀ tergite 3 clearly present .......... 4

Setulose area of cell 2a ca 1/2 as wide as that cell and extending to wing margin;
posterior scutellar margin subangular at median and obliquely straight at lateral
sections; median length of frons proper smaller than average width of frontal pro­
cess; ♂ tergite 3 untraceable (in dry specimen). Australia .................................. sp. “S”

4 (3). Female with 1 or 2 pairs of conspicuous tufts of very dense strong bristles on abdo­
nominal dorsum, lacking pregenital plate, urogenital area fenced anteriorly by many
rows of dense fine setae and laterally by strong spines each arising from unusually
large and prominent basal papilla; ♀ with well sclerotized laterite 3, with tergite 3
only ca 1/3 as wide as tergite 6 .................................................. 5

Female lacking above described bristle-tufts but with elongate fairly large pregenital
plate, urogenital area fenced anteriorly by single row of sparse robust setae and
laterally by ordinary setae; ♀ with poorly defined laterite 3, with tergite 3 ca 1/2
as wide as tergite 6. New World .......................................................... albipennis 6 (2). Female often with very small pregenital plate, fencing of urogenital area either similar to schoutedeni or albipennis; ♂ tergite 6 either ca 2 or 4× as wide as long (see
Addendum for revision of couplets 5 and 6) .................................................. 7

Female with above described bristle-tufts, always lacking pregenital plate, fencing of
urogenital area similar to that in schoutedeni; ♂ unknown. S. Africa .......................................................... sp. “T”

7 (6). Tergite 6 in ♀ subtriangular and ca 3/4 as long as wide, in ♂ transversely elliptical
and ca 1/4 as long as wide; ♀ abdominal dorsum with a pair of conspicuous tufts
of very dense strong bristles, urogenital fencing similar to that in schoutedeni (see
couplet 4); aedeagus more elongate. Australia .................................................. sp. “N”

Tergite 6 in both sexes transversely elliptical and ca 1/5 to 1/6 as long as wide; ♀
lacking above described bristle-tufts, urogenital fencing similar to that in albipennis;
aedeagus very short (fig. 127) ........................................................................... 8

8 (7). Wing narrower in proportion (fig. 121); ♀ lacking tergite 3; ♀ with setae on median
area of abdominal venter distinctly paler, longer and finer than those on submedian
area which are more or less spine-like and similar to ventral setae near laterite 3.
Old World .......................................................... ardeae ardeae
Wing broader in proportion (fig. 120); ♂ with tergite 3; ♀ with setae on median and submedian areas of abdominal venter not sharply different in color, length and robustness. N. America..........................ardeae botaurinorum

9 (1). Postvertex anteriorly unilobed; wing not more than 5.2 mm long; jugular area distinctly produced into recurved process.............................................10
Postvertex anteriorly bilobed; wing 5.5 mm long; jugular area angular, not produced into recurved process. C. Africa.......................................................... sp. "O"

10 (9). Abdominal setae longer and denser (fig. 133); postvertex relatively shorter, often anteriorly subtruncate. Oriental Region ..................................omnisetosa
Abdominal setae shorter and sparser (fig. 131); postvertex relatively longer, never anteriorly subtruncate. New World ........................................... holoptera holoptera

**Icosta (Ardmoeca) albipennis (Say)**

*Olfersia albipennis* Say, 1823: 101. Type lost, *Ardea h. herodias*, "United States"; neotype ♀ (not seen by me) in Nebraska Univ., *Butorides v. virescens*, Nebraska.

*O. propinqua* Wk., 1849: 1141. Type: ♂ (BMNH), ex (?) bird, Jamaica.

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Fig. 123. **Icosta (Ardmoeca) albipennis** Say, Galapagos Is., ♀ abdomen.


Olfer sia palustris Lutz, 1915: 183, pl. 28, fig. 4. Lectotype ♂, here designated, (MCZ), ex Tigrisoma lineatum marmoratum, Brazil.


MATERIAL. Some 100 specimens at AMNH, BMNH, CAS, CNHM, MCZ and USNM, largely previously studied and listed by Bequaert (1955, 1957), were checked. Summation of their collection data follows.

CANADA: Quebec, Anas brasi­liensis, 1 record.

U.S.A.: Alabama, Florida e. caerulea, 1 record. Florida, Ardea h. herodias, 2; no host, 1. Iowa, Ardea h. herodias, 1, Kansas, Nycticorax nycticorax hoactli, 1. Louisiana, no host, 1. Maryland, no host, 1. Massachusetts, N. nycticorax hoactli, 1; Tringa melanoleuca, 1. Minnesota, no host, 1. Mississippi, Butorides v. virescens, 1. New Hampshire, Cosmerodius ilbus egretta, 1. New Jersey, Ardea h. herodias, 1. New York, Butorides v. virescens, 1;

Fig. 124. Icosta (Ardmoeca) albipennis Say, Galapagos Is., ♂ abdomen including genitalia.
Florida c. caerulea, 1; N. nycticorax hoactli, 1; no host, 1. North Carolina, no host, 1. Ohio, Cosmerodius albus egretta, 1; Falco s. sparverius, 1. South Carolina, Leucophoyx th. thula, 1. Texas, Dichromanassa r. rafescens, 1; Hydranassa tricolor, 1; Nyctanassa v. violacea, 1. Utah, Leucophoyx th. thula, 1.

W. INDIES: Bahama, Butorides virens bahamensis, 1 record. Cuba, Nyctanassa v. violacea, 1; no host, 1. Jamaica, Ardea h. herodias, 1; Butorides virens maculatus, 1; no host, 1 (types of propinqua Wk.).


S. AMERICA: Colombia, Leucophoyx th. thula, 1 record; no host, 1. Guiana, Theristicus caudatus, 1. Brazil, Anas brasilensis, 1; Ardea coeci, 1 (paratype of palustris Lutz); Tigrisoma lineatum marmoratum, 1 (lectotype of palustris Lutz). Paraguay, no host, 1. Argentina, T. lineatum marmoratum, 1. Galapagos, Ardea herodias cognata, 2; Butorides sundevalli, 1; Nyctanassa violacea pauper, 4, Pelecanus occidentalis, 1; no host, 3.

Habitats. All over Neotropical Region including the Galapagos, spreading northward to Nearctic Region where it overlaps practically entire range of ardeae botaurinorum Swk. There was only 1 odd record for “albipennis” (Beq. 1955) each from British Columbia (Wasa), Washington (Pullman), Montana (Ravalli) and Wyoming (no precise locality), and none from Oregon, Idaho, California, Nevada, Utah, Colorado, Arizona and New Mexico. (Recently I received from Dr Elbel a ^ ex Leucophoyx, Fish Springs, Utah. See above). The scarcity of this, or these, ardeid-infesting flies in the Rocky Mts and western slope is noteworthy. From the above list, albipennis is apparently more abundant, has a much wider host range than botaurinorum, and is apparently breeding on Ciconiformes: Ardeidae (Ardea, Butorides, Cosmerodius, Cochlearius, Dichromanassa, Florida, Hydranassa, Ixobrychus, Leucophoyx, Nyctanassa, Nycticorax, Tigrisoma). Its occurrence on the following birds is probably accidental. Pelecaniformes: Pelecanidae (Pelecanus); Ciconiformes: Threskiornithidae (Theristicus), Ciconiidae (Ardea); Anseriformes: Anatidae (Anas); Falconiformes: Falconidae (Falco); Charadriformes: Tringa. In addition to the above enumerated genera, Bequaert (l. c.) also listed 1 record each (except Mycteria which has 2 records) of the following as hosts of “albipennis”: Ardeidae (Mesembrinibus, Brazil; Syringa, Argentina); Threskiornithidae (Eudocimus=Guara, Cuba), Ciconiidae (Mycteria, Ohio and Mexico); Accipitriformes (Accipiter, Pennsylvania); Eurypygidae (Eurypyga, Brazil); Rallidae (Porphyry, Kansas; Porzana, Kansas); Laridae (Larus, Galapagos); Strigidae (Rhinotyph, Brazil; Tyto, S. Carolina); Thraupidae (Piranga, Virginia). I am unable to verify these records, most of which probably referred to true albipennis and only a few (perhaps Accipiter, Porphyry, Porzana, Tyto, Piranga), to botaurinorum.

Systematics. The nomenclature of this species is exceedingly confusing. In addition to the synonyms listed above, it was called, by misidentifications at one time or another, ardeae Mcq., botaurinorum Swk., intertropica Wk. and massonnati Falc. (see Beq. 1955: 331–32). On the other hand, the name albipennis was applied also to ardeae and botaurinorum, notably since Bequaert (l. c.) lumped together these 3 names. I (1964: 88-89) first raised doubts about the correctness of Bequaert’s conclusion by pointing out some differences between the Old and New World forms while Theodor et al. (1964: 47) suggested to
call the Old World form *Lynchia albipennis ardeae*. Upon my request, Dr Alan Stone very kindly compared the neotype of *albipennis* with some of my Galapagos specimens and found they were conspecific as far as their body size, extent of wing-setulae (fig. 119), abdominal chaetotaxy (fig. 123, 124) and ♀ pregenital plate (fig. 138) are concerned. This results that the name *albipennis* must be applied only to the southern form of the New World and *ardeae*, to an independent species occurring in the Old World as well as the northern part of the New World. According to Dr Stone (*in litt.*), the wing length in the neotype of *albipennis* is 5.25 mm, in type of *botaurinorum* 5.95, in type of *scutellaris* 5.6. Other differences of *albipennis* from *ardeae*, incl. *botaurinorum*, are: prescutum with laterocentral bristles, setulose stripe in cell 2a not broader, or hardly so, than vein 2A and not reaching, or hardly so, apical margin of that cell (in *ardeae* more than 2X as broad as that vein, and at its broadest point nearly 1/3 to 1/2 as broad as cell 2a, and always reaching apical margin of that cell); ♀ abdominal membrane with numerous pale fine setae, no black erect robust setae near spiracle 5, all setae on lateral areas of membrane distinctly finer than those on laterite 3 (in ♀ *ardeae*, with black erect robust setae near spiracle 5, most setae on lateral area of membrane almost as robust as those on laterite 3); ♀ tergite 3 always present (in *ardeae*, present or absent); ♀ pregenital plate large, elongate, well pigmented and sclerotized (in *ardeae*, very small, subtriangular, usually poorly pigmented and sclerotized); aedeagus longer, with weaker basal bulging. *Albipennis* was so named by T. Say because of the pollinosity which results in the appearance of the wings (and other parts of body, notably thoracic dorsum) as if dusted with a gray powder and which also occurs in *ardeae* and *Olfersia* species as well as many dragonflies (see Ferris 1930c: 70). Here this species is placed at the beginning of the subgenus chiefly on the basis of the well developed ♀ pregenital plate which is rudimentary in *ardeae* and undefinable in other *Ardmoeca* species. The palpus, prosterum, fore tarsus and hind tibia are as in fig. 2, 7, 10 and 11, respectively.

Icosta (*Ardmoeca*) *ardeae* *botaurinorum* (Swenk), new status  
Fig. 120, 125.

*Olfersia botaurinorum* Swk., 1916: 128. Type ♀ (not seen by me) in Nebraska Univ., ex *Ixobrychus e. exilis*, Nebraska.

*O. scutellaris* Swk., 1916: 128. Type ♀ (not seen by me) in Nebraska Univ., ex *I. e. exilis*, Michigan.


**Material.** Some 100 specimens at AMNH, BRX, CAS, CNHM, LDN, MCZ and USNM, largely previously studied and listed by Bequaert (1955, 1957), were checked. Their collection data are summarized as follows:


Ex *Ixobrychus exilis*: North Carolina 1 record, South Dakota 1.

Ex *Nycticorax nycticorax*: Pennsylvania 1 record.

Ex *Pandion haliaetus*: New York 1 record.

No host records: Ontario 1 record, Florida 1, Indiana 1, Iowa 1, Massachusetts 1, Ohio 1, Pennsylvania 1, Wisconsin 1.
Habitats. Widely spread over southern half of Nearctic Region. In Canada, it was reported as *albipennis* Say by Bequaert (*l.c.*) from Alberta (54°N) and British Columbia; in the United States it is, as listed above, known from Wyoming, South Dakota, Minnesota, Wisconsin, etc., in the north, and from Louisiana and Florida in the south. The southernmost limit of its range is not yet clear. In the MCZ collection, I noted 1♂ labeled "Cuba. Coll. H. Loew" and 2♀ "Rio de Janeiro, Coll. C. W. Johnson". For unknown reasons all 3 specimens were not included in Bequaert's list. As appropriately suggested by the name *botaurinorum*, the most preferred host of this subspecies is *Botaurus lentiginosus* Rackett, and its occurrence on *Ixobrychus exilis* Gmelin and *Nycticorax nycticorax* Linn. is almost negligible. These 3 birds all belong to Ciconiiformes: Ardeidae and seem to be very rarely, if ever, serving as hosts of true *albipennis* (*q.v.*). The odd record from Falconiformes: Pandionidae (*Pandion*) is probably a stray.

Systematics. This is a weak geographical race of *ardeae*. For its difference from the Old World counterpart, see key and discussions under the nominate subspecies. The names *botaurinorum* and *scutellaris* were published in the same article. Since the former has page priority, it was based upon 2, rather than 1, original specimens and has been used more often; it is selected here for this race. From Swenk's descriptions, *botaurinorum* differs from *scutellaris* in having the "visible basal width of apical section of clypeus along dividing sulcation" not more than 1/3 distance (in *scutellaris*, 3/8) across emargination between lateral apices; mesonotum and scutellum blackish brown (in *scutellaris*,...
mesonotum dark brown, scutellum yellowish); orbital margins shining, glabrous (in scutellaris, opaque, hairy). None of these differences is reliable. On the other hand, Bequaert (1955: 342-44) examined 77 specimens of a mixture of botaurinorum plus albipennis and found the subcosta was incomplete in both wings in about 1/2 of them, complete in both wings in about 1/3, and incomplete in only one wing in less than 1/4. By typographical error, scutellaris was wrongly listed by me (1963: 64, 114) as a synonym of americana Lch. Theodor et al. (1964: 47) mentioned that the ♀ tergite 3 in American examples was almost 2X as large as that in Old World ones. This does not agree with my observation and possibly they were dealing with true albipennis against ardeae ardeae. Measurements of 10 ♀♀ of botaurinorum picked up at random revealed that their tergite 3 varied, 3-5 micrometric units in length and 7-11 in width, whereas in ♀♀ from Old World, 6-8 in length and 9-12 in width. The wing and ♀ abdomen are as in fig. 120 and 125, respectively.

Icosta (Ardmoeca) ardeae ardeae (Macquart) Fig. 2, 7, 8, 21, 121, 126, 127, 139, 141, Olfersia ardeae Meq., 1835: 640. Type lost, ex “heron”, Sicily.
O. botauri Rdnr, 1879: 22. Type ♀ in Firenze Mus., ex Pyrrherioda purpurea, C. Italy.
Lynchia setosa Ferr. 1927c: 224, fig. 14-15, ♀♂. Type ♀ (UCB), ex Bulbuleus ibis coromandus, Palawan.

Material. 250± specimens, part of which are selected and listed below. For brevity, field numbers and collector’s names are omitted.

Madagascar: 1♀ (MCZ), w. mites on legs & abd., ex Ardea cinerea johannae. 1♀ (BMNH), Tananarive, ex Bulbuleus i. ibis; 2♀♂, id., Cosmerodium albus melanorhynchus; 1♀, id., Melanophyxx ardeae.


Mozambique: 1♀ (SAIMR), Limpopo, ex C. albus, VIII.1953.

Rhodesia: 2♂♀ (MAC, SAIMR), nr Monze, ex E. garzetta, VIII.1959. 1♂, 1♀ (BMNH, MCZ), Matatsi R., Wanki Dist., ex Isobrychus, XII.1932.

Nyasaland: 1♂, 1♀ (BMNH), Chia R. nr shore of Lake Nyasa, ex Ardea goliath, XI.1910. 1♀ (BMNH), Katumbi, Kaporo R., VI.1910. 1♂ (MCZ), Ruo, ex charadrild #124; 1♀, id., Nycticorax nycticorax. 1♂ (MCZ), SW Lake Nyasa, Mtimbuka, ex E. garzetta, I.1949.

Tanganyika: 2♂♀, 1♀ (BMNH), Dar-es-Salaam, ex egret, VI.1918; 1♀, id., nightjar.


Uganda: 1♂ (MCZ), Buthata, Bunyoro, ex Ibis ibis, III.1936; 1♂, id., Ardea melanocephala. 2♂♀, 4♀♂ (MCZ), Entebbe, ex A. goliath; 1♂, 4♀♂, id., P. purpurea. 1♀ (BMNH), Lake Victoria, Kimi L., ex egret. 1♂, 1♀ (MCZ) (♀ w. mites under abd.), Port Bell nr Kampala. 1♀ (MCZ), Kiageve, Namancene, ex A. melanocephala.
RUANDA-URUNDI: 1♀ (MCZ), Astrida, ex P. purpurea.


NIGERIA: 1♀ (BMNH), Benue R., ex egret. 1♀ (BMNH), nr Lagos, XII.1919. 1♂ (BMNH), Quitah Lagoon, on canoe, VI.1911. 1♀ (BMNH), Zaria, ex Limnocorax flavirostra, XII.1963.

SUDAN: 1♂, 1♀ (BMNH), Wadi Medani, ex Isbyhythus m. minutus, XI.1946. 3♀♀ (MCZ), Kosti, ex A. goliath, V.1936; 2♀♀ id., A. melanocephala; 1♀, id., Actophilornis africana; 1♂, 1♀, id., Gallinula chloropus brachyptera.

Valat, France, ex Necticorax necticorax, IV.1955; 4♂, 2♀, id., P. purpurea; 1♂, 2♀, id., Tringa glareola, VIII.1962. 2♀ (GNV), Genova, Italy, ex B. stellaris, IV.1881; 1♀, w. young mallophagan on abd., Liguria, ex B. stellaris, I.1924; 1♀, w. mite on wing, “Italy”, ex B. stellaris; 1♂, 1♀, Genova, ex P. purpurea, V.1920 & IV.1926; 1♂, id., Cosmerodius albus, IV.1953; 1♂, 1♀ (BMNH, MLN), Parma; 1♀ (MLN), Pavia, XI.1890.

2♂♀, 1♀ (MCZ), Akratiri Bay, Cyprus, ex P. purpurea; 1♀ (MCZ), Yermasoya R., ex Circus cineraceus. 1♂, 2♀♀ (LDN, ZMB ex coll. Loew), Rhodes I.


INDIA: 1♀ (BMNH), Manipur, Moriana, ex Ardeola idae, I.1952.

CEYLAN: 1♀ (MLN), ex Ardea sp., det. Bezz as Olfersia longipalpis Mcq.!

BURMA: 1♂ (MCZ), Myitkyina, ex P. purpurea manillensis, VII.1945; 1♂ (MCZ), id., flying in laboratory.

THAILAND: 1♂, 8 km NNE of Markham, ex Ixobrychus cinamomeus, IV.1966. 1♀ (USNM), Bung Borapet, ex Mesophoyx intermedius, VI.1932. 1♀ (CNHM), Prachau Khirikhan, Ban Khluaklang, ex Dupetor flavicollis, XII.1952.

CHINA: 2♀♀ (USNM), Yalu R., 200-300 km from mouth, Manchuria-Korea border,

KOREA: 1♂ (BMNH), Chemulpo.

SUMATRA: 1♀ (AMS), Lugu, Simalur L, V. 1913.

PHILIPPINES (Mindanao): 1♂ (CNHM), Liquasang Marsh, Cotabato, ex M. i. intermedius, XII. 1946. 5♂♂, 5♀♀, Lake Mainit, Cuyago, Jabonga, Agusan Prov., ex Dupetor f. flavicollis, V. 1963; 2♂♂, 1♀, id., P. purpurea manillensis; 1♂, id., Gallinula chloropus orientalis. 1♂ (CNHM), Davao City, ex Buceros hydrocorax manilensis, XII. 1946.

MICRONESIA: 1♂ (USNM), Saipan.

AUSTRALIA: 1♀ (BMNH), S. Alligator R., Northern Terr., ex Ardea sumatrana, X. 1902. 1♂, 1♀ (MCZ), Northwest I., Queensland, ex Demigretta sacra; 1♂ (ANIC), Heron L., ex D. sacra, XII. 1963.

Habitats. Widespread in the Old World, more commonly met with in the tropics and subtropics. At present known from Sweden, Ireland, England, Netherlands, Germany, France, Czechoslovakia, Italy, E. Prussia (now part of Russia), Greece, Bulgaria, S. Russia in Europe; Tunisia, Egypt, Sudan, Nigeria, Gold Coast, Congo, Ruanda-Urundi, Eritrea, Uganda, Kenya, Tanganyika, Rhodesia, Nyasaland, Transvaal, Bechuanaland, Mozambique, Madagascar in Africa; Arabia, Turkey, Iran, India, Ceylon, Burma, Thailand, China (Manchuria, Taiwan), Korea, Japan, Sumatra, Philippines in Asia; Australia and Mariana in Oceania. The northernmost record was ca 59° N in Sweden and the southernmost, ca 25° S in Transvaal and Queensland. The recorded hosts are Ciconiiformes: Ardeidae (Ardea, Ardeola, Botaurus, Babulcus, Cosmerodius, Demigretta, Dupetor, Egretta, Isobrychus, Melanophoxx, Mesopophoxx, Nycticorax, Pyrrherodita); Ciconiidae (Ibis); Falconiformes: Accipitridae (Circus); Gruiformes: Rallidae (Gallinula, Linmocorax); Charadriiformes: Jancanidae (Actophilornis); Charadriididae (Tringa, Xiphidiopterus); Caprimulgiformes: Caprimulgidae ("nightjar"); Coraciiformes: Bucerotidae (Buceros). Almost certainly breeding solely on Ardeidae.

Systematics. This subspecies has been admirably illustrated by Ferris (l. c.) under the name setosa and its terminalia of both sexes, by Theodor et al. (l. c.) under albipennis. Differing from botaurinorum in having wing (fig. 121) narrower, lateral abdominal setae (fig. 126, 127) more robust, median setae on abdominal venter markedly paler and finer than submedian ones, and tergite 3 (♀) averaging slightly larger. On the strength of these minor differences, ardeae is here placed behind botaurinorum. Bequaert (1955: 349) believed that the absence of tergite 3 in the holotype ♂ of setosa was due either to contraction of the soft areas of the abdomen or to flattening by pressure of the coverglass on the slide-mount. This is not true. In the ♂ ex Egretta, Bechuanaland, the pregenital plate (fig. 139) is unusually large (though not so large as in albipennis) and somewhat elongate, about 3× as long as wide; in the ♂ ex Gallinula, Sudan, the left 1/2 of syntergite 1+2 is much larger than the right 1/2. Besides the synonyms listed above, the nomen nudum Hippobosca metallicia Schummel (1832 Uebersicht Arb. Verand. SchlesiSch. Ges. Vaterl. Cultur: 71) ex Botaurus stellaris. Silesia most probably belongs here, also. Ferris (1927c: 228), merely by guessing from inadequate description, somewhat suspected his setosa being synonymous with nigrita Speis. The palpus, prosternum, fore
femur, thorax and venter of head are as in fig. 2, 7, 8, 21 and 141, respectively.

Icosta (Ardmoeca) sp. “S”

AUSTRALIA: 1♂ (ANIC), Town Cannon, Turtle, ex jabiru [Xenorhynchus asiatus], IX.1958, H.S.L.

Intermediate of albipennis and schoutedeni, chiefly characterized by the shape of frons and scutellum and the chaetotaxy of inner orbits, prescutum and abdomen.

♂. Color dark, wing weakly fuscous, anterior veins blackish brown. Head: Occipital margin hardly convex; vertical and notopleural bristles pale, subequal in length; postvertex only 1/3 as long as wide, its lateral margin abruptly marked off inner orbit and thus conspicuously more raised than latter. Eye 1/4 (11 : 45) as wide as head. Face moderately wide, almost parallel-sided, its width at midpoint smaller (22 : 27) than eye-length; inner 3/5 of surface of inner orbit leathery, only other 2/5 shining; orbital setae 3-seriate, innermost series composed of 6–7 fine erect setae 3× or more as long as fine soft setae of 2 outer series. Frons proper quite short, its median length distinctly smaller than average width of frontal process; frontal process in dorsal aspect uniformly narrow, in profile very broadly rounded off to vibrissal area. Palpus 2× as long as antenna, surface with short black strong but recumbent setae in addition to pale soft setae on inner margin and strong bristles on apex. Gula posteriorly finely setose, no spines. Thorax: Anterior spiracle laterodorsal, moderately large, distinctly smaller than in schoutedeni and in sp. “N”. Mesonotum 49×69; prescutum anterolaterally finely striate, postero-medially smooth; 6-8 laterocentral bristles at each side which are robust and extend beyond transverse mesonotal suture; surface around those bristles also leathery. Scutellum 15×35, hardly shorter (15 : 17) than scutum, posterior margin weakly angular at median and obliquely straight at lateral section. Mesopleural concavity (for receiving femur 1 in repose) less pronounced than in schoutedeni, widened anterolaterally, upper rim less prominent than in sp. “N” and anteriorly stopping near lower margin of spiracle. Mesopleurotergal callus with 3 black strong setae and some pale fine ones, no spines. Prosternum poorly sclerotized, triangular, with 3 pairs of pale fine setae; mesosternum subtruncate anteriorly, base of its bristle equidistant to anterior and lateral margins. Wing 6.5 mm long; surface (incl. alula) entirely setulose except posterior 1/2 of cell 2a; vein rm as thick as adjacent part of R₄₊₅, lying closer (35 : 50) to im than to C-apex and apicad to level of R₂-apex; bulla of M₁₊₂ situated at apical 1/4 of cell 2bc. Tarsal-spine formula 1.0.0/2.1.0/7.1.1.1: tarsomere 1 of hindleg 16×6, longer than 2+3+4 and than 5; tarsomere 2 of same leg slightly asymmetrical, slightly wider than long; tarsomeres 3 and 4 more strongly so. Abdomen: Setae on dorsal striolate area not quite even in distribution, largely shorter than those on lateral areas of membrane; setae on venter largely pale and soft. Syntergite 1+2 with both black and pale setae, black ones nearly uniform in length. Tergite 3 untraceable; tergite 6 large, uniformly setose, with 8± pairs of bristles, anterior and posterior margins subparallel. Laterite 3 significant, uniformly setose as neighboring areas, posteriorly broadly rounded, dorsal part distinctly narrowed apicad, ventral part not so, about same size as dorsal part. Aedeagus and paramere, as seen from pinned specimen, less curved and more slender than in ardea.

Icosta (Ardmoeca) sp. “N”

W. AUSTRALIA: 1♂, 1♀ (ANIC), Crawley, taken in laboratory after examination of shot cormorants, VII. & XI.1936, Norris. 1♀ (BMNH), Houtmans, Albatross I., purchased from Gould (44.66). The BMNH specimen is probably what Walker (1849 : 1142) listed as “Ornithomyia australasiae Fabr.”

Allied to schoutedeni from which the ♀ differs in having no bunches of strong bristles
and the ♂ in having much narrower tergite 6.

♀. Color dark, wing weakly fuscous, anterior veins blackish brown. Head: Occipital margin straight; vertical and notopleural bristles subequal in length, former pale, latter black; postvertex 1/3 as long as wide, strongly convex at disc, gently descending laterad; mediovertex much more depressed than postvertex. Eye 1/4 (11 : 49) as wide as head. Face slightly narrowed anteriorly, its width greater (24 : 11) than that of eye and subequal to eye length; inner orbit 1/2 as wide as mediovertex, outer margin strongly raised, inner depressed and with single series of pale long setae plus few irregularly arranged short ones. Frons proper shorter than average width of frontal process, about as wide as antennal base, anteriorly fairly broadly notched at middle; frontal process in dorsal aspect straight along inner margin, distinctly narrowed apicad, in profile very broadly rounded off to vibrissal area. Palpus 2× as long as antenna, surface largely covered by mixture of pale and black long setae. Gula posteriorly with 2(1+1) spines.

Thorax: Anterior spiracle dorsal, large, 2× as wide as long. Humeral callus anteriorly with fine spines, posteriorly with short fine setae. Mesonotum 56×77; prescutum finely striate all over; latero-central bristles replaced by moderately long setae which are only 2× as long as neighboring shorter setae and far from reaching transverse mesonotal suture. Scutellum 14×39, shorter (14 : 17) than scutum, with evenly curved posterior margin. Mesopleural concavity very pronounced, with distinct upper rim. Metapleurotergal callus bearing 3–4 long spines and some soft setae of similar length. Prosternum exceedingly small, triangular, poorly sclerotized, with 1 pair of pale setae; mesosternum emarginate anteriorly, base of its bristle closer to anterior than to lateral margin, mesosternum posteromediadly with small patch of pale setae. Wing 7.8 mm long; surface (incl. alula) entirely setulose but setulose stripe of cell 2a only 2× as wide as vein 2A and not reaching apical margin of that cell; vein rm as thick as adjacent part of R4+5, closer (46 : 53) to im than to apex of C, lying apicad to level of apex of R1; bulla of M1+2 situated at apical 1/3 of cell 2bc. Tarsal-spine formula 2.1.1.0/2.1.0/8.2.1.1; tarsomere 1 of hindleg 15×6, hardly longer than 2+3+4 and than 5, tarsomere 2 of same leg slightly asymmetrical, slightly shorter than wide, tarsomeres 3 and 4 more distinctly so. Abdomen quite unevenly setose; syntergite 1+2 slightly produced posterolaterally, uniformly covered with long pale setae, lateral marginal area with some small black setae. Tergite 3 bare, 2× as wide as long, hardly larger than anterior thoracic spiracle. Laterite 3 in dorsal view subquadrate, slightly longer than wide, ca 1/2 as wide as mesonotum, inner margin very gently curved, surface bare, only with a few fine black setae etched to level of spiracle 3. Dorsal striolate area largely bare, with a few small black papillae at sides of tergite 3 and a row of larger papillae shortly before tergite 6, those small papillae bearing pale small setae, fringed with strong bristles. Laterite 6 subtriangular, 31×42, narrowly rounded at apex, surface with sparse pale fine setae, fringed with strong bristles. Laterite 2 almost entirely bare; venter of laterite 3 similarly shaped as its dorsum, 37×26, outer 1/2 with sparse strong short setae, inner 1/2 bare. Setae of abdominal ventral membrane largely pale, moderately long and recumbent; those intermediate of laterite 3 and urogenital openings short, spine-like and with exceedingly large and prominent basal papillae; those lining immediately before urogenital openings pale, fine, dense and each emerging from prominent blackish papilla.

♂. Similar. Wing 6.7 mm long. Tarsal spines 1.0.0.0/2.1.1.0/7.2.1.1. Abdominal dorsal striolate area with more numerous and extensive pale setae; tergite 3 (?); laterite 3 (not clearly definable in unique dry specimen) uniformly covered with rather long black setae; no patch of spines between laterite 3 and tergite 6; tergite 6 ca 2× as wide as long, with long black setae and posterolaterally with 3–4 pairs of bristles. Chaetotaxy of abdominal venter similar to that of dorsum. Genitalia in profile, as seen in pinned specimen, similar to that in schoutedeni but
aedeagus more slender, apically slightly more curved, paramere apically less acute.

**Icosta** (Ardmoeca) sp. "T"

One ♀ (SAIMR) ex *Microcarbo africanus*, Beroni, Transvaal, VI.1954 has uniformly short laterocentral setae on prescutum. It may be either an independent species or a geographical race of *schoutedeni*.

**Icosta** (Ardmoeca) sp. "F"

Chao (1949 Fukien Christ. Univ. Agric. J. 10: 143, 146) listed a specimen (?) sex) determined by Bequaert as *schoutedeni* and collected ex *Cosmerodius albus modestus*, Fukien, SE China. This record was repeated by Bequaert (1953a: 252). The specimen in question, not seen by me, was said to be deposited in Zool. Inst., Academia Sinica, Shanghai. The occurrence of *schoutedeni* in the interior of China seems most improbable and the species involved is quite likely an undescribed one.

**Icosta** (Ardmoeca) *massonnati* (Falcoz)

*Ornithoponus massonnati* Falc., 1926: 31, fig. 28-29, ♀, as n. name for *Olfersia americana* (misidentification) of Massonnat 1909: 304, pl. 5, fig. 40-42, ♀. Type presumably lost, ex *Platalea leucorodia*, eastern France.


This enigmatic species was so far known from a single specimen said to be ♀. The true identity was discussed by Bequaert (1945b: 94, 1953: 253), Maa (1964: 95) and Theodor et al. (i.e.) but remains uncertain. The 2 former authors suggested to be synonymous with *schoutedeni*, while the latter ones suggested it synonymous with *schoutedeni* or *dukei*. Following the discoveries of related species in Transvaal and Australia and by checking once again Massonnat's paper, I am now inclined to accept *massonnati* as an independent species. Massonnat did not draw the abdominal chaetotaxy properly (all hairs were as if exceedingly fine including those on tergite 6) but described "En arrière du bourrelet, on trouve une partie médiane blanche et des parties latérales de couleur marron foncé, couvertes de poils noirs, courts et gros. Plus en arrière, toujours latéralement, on observe une partie moins chitinisée avec poils noirs plus longs. Enfin, tout à fait en arrière, se trouve une région marron clair, bien délimitée avec quelques poils noirs, longs, surtout à la partie postérieure." (This passage was omitted in Falcoz and Theodor et al. papers). There is a pair of tufts of "courts et gros" hairs caudal to laterites 3 in his figure and these are exactly at the same position as in *schoutedeni*. The absence of another pair of bristle-tufts at sides of tergite 3, a feature similar to that in sp. "N" from Australia, is most probably real and serves as a marked difference from *schoutedeni*. The possible synonymity of *massonnati* with *dukei*, suggested by Theodor et al., is not accepted here. In Massonnat's figures, the inner orbit is so wide, palpi so short, vein 2A so short (far from reaching level of rm) and laterites 3 so characteristic (in dorsal view, nearly isogonally triangular, anterior margin strongly divergent from syntergite 1+2) that it can hardly be mistaken for *dukei* which belongs to the subgenus *Ornithoponus* and is so far unrecorded from north of the Sahara. The occurrence of *massonnati* on an aquatic bird (Ciconiiformes: Threskiornithidae) also fits the general host pattern of *Ardmoeca*. 
Lynchia schoutedeni Beq., 1945b: 93, fig. 1, ♀ ♂, as n. sp., actually n. name for *L. palustris* (misidentification) of Beq. 1933: 71. Type: ♂ (MAC), ex Halietor africanus, Congo.
— Theod. & Oldr. 1964: 50, fig. 79-82, ♂ ♂.

**Material.** 15+ specimens, among which the following are new records. RUANDA: 1♂ (MCZ), Ruhengeri, ex cormorant, 1948, Fain. 1♂ (MCZ), Lake Mohasi, ex Pelecanus onocrotalus, IV.1953, Fain. UGANDA: 1♂ (BMNH), Lodwar, Turkana Prov., VI. 1934, Rudolf.

**Habitats.** W. and E. African Subregions, at present known from Congo, Ruanda, Uganda, Kenya and Ethiopia. On Pelecaniformes: Phalacrocoracidae (*Anhinga, Halietor, Phalacrocorax*) and Pelecanidae (*Pelecanus*), the last record is probably a stray.

**Systematics.** This species was recently redescribed and illustrated (head, ♀ abdomen, ♂ genitalia) by Theodor et al. The sexual dimorphism is so strong and the ♂ so characteristic in abdominal chaetotaxy and sclerotization that *schoutedeni* is clearly the most highly specialized species of the subgroup. The ♂, on the other hand, is fairly normal for the genus in abdominal chaetotaxy. Its laterite 3 is larger and more sclerotized, otherwise very similar to ♂ *albipennis* or *ardeae*. The palpus is as in fig. 5.

**Lycostia (Ardmoeca) holoptera holoptera (Lutz)** Fig. 3, 7, 10, 12, 128-131.

Olfersia holoptera Lutz, 1915: 184. Type ♂ (not seen by me) in Inst. Osw. Cruz in Rio de Janeiro, ex Rhynchotus r. rufescens, Brazil.

Lynchia holoptera: Beq. 1955: 355, fig. 67-69, ♀ ♂.

**Material.** No fresh material available.

**Habitats.** Little collected. Available records are sporadic and are from the U.S.A. (Massachusetts, Ohio, Pennsylvania, S. Carolina, Wisconsin) and Brazil (State of Rio de Janeiro). Probably widely distributed over Nearctic and Neotropical Regions. Oligoxenous on Gruiformes: Rallidae (*Arinidae, Courtoigia, Rallus*). The odd records ex Tinamiformes: Tinamidae (*Rhynchotus*) and Passeriformes: Formicariidae (*Thamnophilus*) are most probably strays.

**Systematics.** The ♂ of this species was first briefly described by Bequaert (1957: 578) while the ♂ was illustrated by MacArthur (1948: 410, 425, fig. 252-253) and Bequaert (1955: 355, fig. 67-69). The abdomen (fig. 128-131) in this and next species does not show as much specialization as found in *schoutedeni*, but the head, venacon and wing-setula extent are evidently more specialized. Since the former character seems to be of less phylogenetic significance than the latter, these 2 species are here placed on the top of the subgroup. In Bequaert's (1955) scheme of American species, *holoptera* was arranged between *risuta* and *plaumanni* and near the top of the genus. The palpus, prosternum, fore tarsus and hind tibia are as in fig. 3, 7, 10 and 12, respectively.

**Lycostia (Ardmoeca) holoptera omnisetosa** Maa, new subspecies Fig. 3, 7, 14, 22, 122, 132-134, 142, 147, 148.

**Material.** 6♂, 1♀. Holotype ♂ (BISHOP 7595); allotype ♂ and most paratypes (BISHOP), 2 paratypes (CNHM), 1 paratype each (BMNH and MCZ).
Fig. 128-131. *Icosta* (*Ardroeca*) holoptera holoptera Lutz, Colombia, ♀ postgenital plate (128), ♀ genitalia (129), ♀ tergite 6 (130), ♀ abdomen in ventral view (131).


PHILIPPINES: 1♂, Dalton Pass, Nueva Vizcaya, Luzon, ex *Lanius cristatus*, 6E 0167, VIII.1965, M.A.P.S.


CHINA: 1♂ (MCZ), Tunglu, Chekiang.
Fig. 132-134. *Icosta (Icosta) holoptera omnisetosa* Maa, Malaya (♀) and New Guinea (♂), ♀ abdomen (133), ♀ tergite 6 (132) and ♂ genitalia (134).

**Habitats.** Probably widely spread over the Oriental Region; at present, known only from SE China (Chekiang), Malaya, Philippines (Luzon) and New Guinea, lowland. Oligoxenous on Gruiformes: Rallidae (*Amaurornis, Gallinula, Porphyrio, Porzana, Rallus*), with one stray record ex Charadriiformes: Charadriidae (*Capella*), which frequent similar habitats as in rallids. The odd record ex *Lanius* is apparently a straggler or contamination.

**Systematics.** A weak geographical race of *holoptera* (see couplet 10 of the key). The description given below is based on New Guinea material. In Malayan specimens, the wings are slightly narrower in proportion, ♀ gula posteriorly spinose, ♀ mesosternum with 10± spines behind fore coxal cavity and ♀ tarsomere 1 of hindleg with 10 spines beneath. These may be merely individual variation.

♀. **Color** dark, wing weakly fuscous. **Head** (fig. 14): Occipital margin weakly convex; vertical bristle as long as notopleural bristle, often pale; postvertex moderately long. Face very wide, almost parallel-sided. Frons proper long, narrowly roundly notched at middle; frontal process in dorsal view almost uniformly narrow, in profile very broadly rounded off to vibrissal area. Palpus (fig. 3) 1.5× as long as antenna. Venter of head (fig. 142) with a pair of erect tooth-like jugular processes near bases of vibrissal bristles (i.e., near sides of rostral membrane);
gula posteriorly spinose. Thorax (fig. 22): Mesonotum 49×60; prescutum sparsely feebly striate all over, with 3-4 anterolateral bristles which reach or surpass transverse mesonotal suture; scutellum 11×28, posterolaterally rounded, posteriorly distinctly convex. Metapleurotergal callus with 3-4 stout spines. Prosternum (fig. 7) well sclerotized, very small, semicircular, with 2-3 pairs of stiff setae; mesosternum roundly shallowly notched, its bristle 1.5× as far from lateral margin as from anterior margin. Wing (fig. 122) 4.8-5.2 mm long; setulae covering entire membrane including alula; upper surface of cell 2a with very narrow bare stripe along posterior margin; vein rm as thick as adjacent part of R4+5. Femur and tibia 3 as in fig. 147, 148. Tarsal spines 2.1.1.0/2.1.1.0/7-8.2.2.1; tarsomere 1 of hindleg 18×8, as long as 2+3+4 and as 5, tarsomere 2 slightly wider than long and as tarsomeres 3 and 4, distinctly asymmetrical. Abdomen (fig. 132) rather uniformly covered with moderately long and stout setae; dorsal striolate area largely bare, with 6 small groups of setae; setae on median and lateral areas of venter similar in length and robustness, those fencing urogenital area hardly more robust and not longer than elsewhere. Syntergite 1+2 with short setae; tergite 3 small; tergite 6 (fig. 132) large, uniformly setose, with 10± pairs of bristles, anterior and posterior margins almost parallel. Laterite 2 membranous, with few very stout setae; laterite 3 well sclerotized, slightly wider than long, broadly rounded posteriorly, dorsal part smaller and distinctly narrowed behind, ventral part larger and evenly broad. Pregenital plate undefinable; postgenital plate more setose than in ardeae, with 40± minute setae; infra-anal plate more uniformly setose than in ardeae.

♂. Similar. Gula posteriorly setose. Tergite 3 larger; ventral setae at level of spiracle 2 distinctly shorter and stouter than in ♀. Genitalia (fig. 134) as in ardeae, but aedeagus longer and more slender, apical part of paramere longer and less decurved, postgenital plate also longer in proportion.

Icosta (Ardneca) sp. "O"

ETHIOPIA: 1♀ (BMNH), Sululta, 2300 m, ex Gallinago [Capella] nigripennis, VII. 1948, Guichard.

Possibly another geographical race of holoptera.

Postvertex 4/5 as long as mediovertex, discally depressed, anteriorly bilobed. Inner orbit more than 1/2 as wide as mediovertex. Frons proper slightly narrower than base of antenna. Jugular area sharply angular but not produced as an ental process at each side. Prescutum with both ordinary short setae and long laterocentral bristles, latter as long as median scutellar length, not reaching transverse mesonotal suture. Anterior thoracic spiracle narrow, laterodorsal. Mesopleural concavity (for reception of femur 1 in repose) widened anteroventrad, as in schoutedeni but much shallower. Wing 5.5 mm long, setulae distributed as in holoptera, i.e., covering entire lower surface. Abdominal dorsum lacking bristle-tufts; tergite 6 of usual size; urogenital area anteriorly fenced by ordinary setae, not by those as found in schoutedeni ♀.

Subgenus Gypoeca Maa, new subgenus

TYPE-SPECIES. Lynchia meda Maa, by present designation.

Distribution. 1 species, Ethiopian, and part of Palaeartic and Oriental Regions, i.e., from S. Africa to India via E. Mediterranean Basin.

Host Relationships. Oligoxenous, on Aegypiinae or vultures.

Diagnosis. Scutellar bristles submedian, not lateral; anterior thoracic spiracle dorsal, fairly large. Femora 1-2 in ♀ with group of strong spines on ventral margin. Tergite 3
absent in ♂, large in ♀; tergite 6 narrowly interrupted at middle in ♂, very large in ♀. In fully matured ♀, sternite 5 large, medially interrupted, laterites 3 and 6 both large, well sclerotized. Urogenital openings slightly shifted cephalad. Aedeagus long, slender, apically straight.

**Affinities.** Isolated in the genus. The size of anterior thoracic spiracles, degree of sclerotization in ♀ abdomen and the position of urogenital openings bring the subgenus fairly close to *Phthona*, and perhaps it might be more proper to be placed there instead. The name is derived from Greek, *gyps, gypos*, a vulture; *oeka, oekos*, belonging to a house.

*Icosta (Gypoeca) meda* (Maa) Fig. 4, 7, 9, 10, 12, 137.


*L. interrupta* Maa, 1964: 100, fig. 28-34, ♂. Type: ♀ (BISHOP), ex “vulture”. Bechuanaland. New synonymy.


**Habitats.** Probably all over continental Africa and spreading eastward to India via E. Mediterranean Basin; at present known from Natal, Bechuanaland, Uganda, Kenya, Israel, Iraq and India. On Falconiformes: Accipitridae: *Aegypinae* (*Aegypius, Gyps, Neophron, Pseudogyps, Torgos*).

**Systematics.** Since published, Prof Theodor (in litt.) kindly pointed out *interrupta* to be the opposite sex of *meda*. A direct comparison of the unique types of *interrupta* and *meda* with type series of *barbata* revealed that all 3 names refer to one and the same species. The palpus, prosternum, fore femur, fore tarsus, hind tibia and wing are as in fig. 4, 7, 9, 10, 12 and 137, respectively.

**Subgenus Rhyponotum** Maa, new subgenus

**Type-species.** *Olfersia pilosa* Mcq., here designated.

**Distribution.** 1 (possibly 2) species, continental Ethiopian Region, spreading to Palaeartic (Mediterranean) Region in certain seasons.

**Host Relationships.** Oligoxenous, on Gruiformes (Otididae).

**Diagnosis.** Inner orbit (fig. 166) except its narrow outer margin very densely setulose, hence giving a leathery appearance; palpus (fig. 4) hardly longer than wide, strongly narrowed apicad. Thorax (fig. 163) very strongly flattened; mesonotum and scutellum uniformly covered with short recumbent and fairly strong setae; anterior spiracle dorsal, moderately large; scutellum lacking median furrow; prosternum (fig. 7) convexly curved
Cell 2bc (fig. 136) exceptionally short (abscissa 1 of vein M₁₊₂ less than 1/2 as long as 2), abscissa 2 of R₄₊₅ slightly shorter than its distance to wing-apex; hind margin of alula vein-like, very broadly thickened; venter of all tarsi (fig. 164, 165) strongly setose. Abdomen (fig. 161, 162) with dense setae on dorsal striolate area; in ♂ with robust pointed spines on tergite 6 and with 7–12 exceedingly strong blunt spines on each side; in ♀ with tergite 6 posteriorly distinctly bilobed and with laterite 7 very strongly raised and bristled. Aedeagus (fig. 162) long, in profile broadest at a point of basal 1/4, from there strongly narrowed basad, extreme apex gently decurved.

*Affinities.* Isolated in the genus. Superficially somewhat similar to *Pseudolynchia* because of the dense pilosity on inner orbits and thoracic dorsum. The subgeneric name is in allusion to that character (Greek *rhýpos*, dirt, unclean; *notós*, wide surface, the back).
Icosta (Rhyponotum) pilosa (Macquart)  Fig. 4, 7, 12, 136, 161–166.


*Lynchia pilosa*: Beq. 1945b: 90, ♂ ♀.—Ma 1964: 95.

**MATERIAL.** 50± specimens.

**CONGO**: 1♀ (MAC), Terr. de Banningville, R. Kwilu, Bagata, ex *Lissottis melanogaster*, 11.1945, A. Fain.

**SUDAN**: 1♀ (BMNH), Darfur, El Fisher, 1920, H. Lynes.

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**Fig. 138–143. Icosta species, ♀♀, details of certain structures.** 138–139, pregenital plates showing variation, drawn to same scale (138, albilippens, Galapagos Is.; 139, ardeae ardeae, Taiwan); 140, samoana, wing, redrawn from Ferris 1927b; 141–142, venter of head showing absence and presence of jugular process, drawn to same scale (141, ardeae ardeae, Taiwan; 142, *holopera omnisetosa*, Malaya); 143, *longipalpis*, Thailand, venter of thorax showing weakly developed metasternal process.


**UGANDA**: 1♂ (BMNH), Entebbe.

**S. AFRICA**: 1♂, 2♀♀ (SAIMR), Ontjo, SW Africa, ex *Pterocles bicinctus*, IX.1952. 1♀ (SAIMR), Namutolic, ex *Ch. kori*, IX.1952. 4♀♀ (MAC, SAIMR), nr Tsane, Bechuanaland, ex *Ch. kori*, I.1955. 1♂, 5♀♀ (MAC), nr Kikong, Bechuanaland, ex *Ch. kori*, I. 1958. 2♂♂, 2♀♀ (SAIMR), Oebete, Bechuanaland, ex *Ch. kori*, VII.1956. 1♀ (SAIMR), Debeti, Bechuanaland, ex *Ch. kori*, VII.1956. 1♀ (BMNH), Wolmaranstad Distr., Transvaal, ex *Afrotis atra*, VI.1902, Hamilton. 1♂ (SAIMR), Rive del Lago Tuai, ex *Choriotis kori struthiunculus*, XI.1938.
Habits. Widely spread in E. and S. African Subregions, so far known from Sudan, Ethiopia, Kenya, Uganda, Tanganyika, Rhodesia, SW Africa, Bechuanaland, Transvaal, Orange State and Zululand. Its records from Morocco and Congo may perhaps be considered seasonal or strays; that from the Reunion I. (Bigot 1863 In Maillard, Notes sur l'île de la Réunion: M38) is apparently erroneous. Breeding on Otididae. Recorded hosts are Galliformes: Phasianidae (Francolinus); Gruiformes: Otididae (Afrotis, Choriotis, Eupodotis, Lissotis, Neotis); Columbiformes: Pteroclidae (Pterocles).

Fig. 144-154. I costa species, ♂♂, details of legs. 144-146, right hind tarsi, showing number and arrangement of sensilla, drawn to same scale, ordinary setae omitted (144, lonchurae, Taiwan; 145, minor, Gabon; 146, sensilis sensilis, Thailand); 147-148, right hind femur and tibia in posterior and anterior views showing setoseness in subgenus Aridnoeca, drawn to same scale; 149-150, left hind basitarsi, showing differences in shape and chaetotaxy, magnifications varied; 151, left mid tarsus, showing presence of peg-like spines; 152, left fore basitarsus; 153, left mid basitarsus; 154, left hind tarsus. All except fig. 147-148 in ventral view.
Systematics. This species seems to have never been illustrated and the only redescription was by Bequaert (i.e.). The sexual dimorphism is strong and concerned chiefly with the shape of tergite 6 and the nature of tarsal and abdominal chaetotaxy rather than with the relative width of interocular face and the extent of wing-setulae as stressed by Bequaert. The wing-setulae in ♀ are generally less extensive than, but occasionally as extensive as in ♂ (fig. 136). There is thus no clear cut difference in sexes in this respect. The spines on humeral callus, anepisternum and femur 1 are scanty and relatively weak, but on metapleurotergal callus there are 10± very strong spines arranged in single row. The hind tibia is as in fig. 12. The tarsal-spine formula is 1.(1).(1).0/1.1.0.14(12+2).2.2.2 in ♂ and 1.(1).(1).0/2.1.1.0/8(7+1).2.2.2 in ♀; in addition, there is, particularly in ♂, a good number of minor spines amid ordinary setae. Tergite 6 in ♂ is normal in shape but with its long bristles replaced by unusually robust spines; in ♀, it is posteriorly bilobed and with long bristles. Other character sare as in the accompanying figures. I noted in MCZ a damaged but abnormal ♂ collected along with anormal ♂ ex Choriotes kori 2013 at Kenya, 12°5 S, 35°10' E to 1°38' S, 35°17° E, 120 km WSW of Naork. Its wing is 8.5 mm long (in normal ♂ pilosa, 5.5-7 mm), palpus and postvertex relatively shorter, wing-setulae less extensive, mesonotum with some black bristles and pale recumbent setae, abdomen with fewer lateral spines. Without dissection of fresh material the systematic status of that very specimen is uncertain. It may be either individual variation or a second species of the subgenus.

Genus Phthona Maa, new genus

Type-species. Olfersia nigrita Speis., here designated.

Distribution. 3 species, all Oriental, 1 each in Indo-Chinese, Malaysian and Philippine Subregions.

Host Relationships. Monoxenous, on Microhierax (Falconidae) or falconets which nest in old holes left by woodpeckers or barbets.

Diagnosis. Eye exceedingly small, not broader, or hardly so, than inner orbit (in front view of head). Thorax sometimes unusually short; scutellum always very short, posteriorly subtruncate; anterior thoracic spiracle dorsal, large; pronotum (fig. 167-169) large, as strongly pigmented and sclerotized as mesosternum and lying on same level as latter. Wing often abnormal in shape, sometimes strongly narrowed; tibiae (fig. 12) and tarsi apparently with only sensory pores, no sensilla. Urogenital openings strongly shifted forward; tergite 6 medially always interrupted; ♀ often with large oblique plates near abdominal apex. Aedeagus in profile slender to moderately robust, strongly curved near apex, virtually straight near apex. Sexual dimorphism strong, chiefly with abdominal sclerotization.

Affinities. Isolated and obviously the most highly specialized in the Icosta complex. The speciation is evidenced not only by structural peculiarities and strong sexual dimorphism but also, by the fact that though all species included are monoxenous on the same bird-genus in 3 neighboring Subregions, they differs sharply from one another. It is also interesting to note that the 2 southern forms are less specialized and closer to each other than to the northern form. The subgeneric name is in allusion to the small eyes, large dorsal thoracic spiracles and short truncate scutellum as if a person were very angry and envious (Greek phthonos, an envy).
Fig. 155-160. Icosta species, ♂ genitalia, magnifications varied. ♂ postgenital plate shown is of recessa.

KEY TO SPECIES OF PHTONA

1. Apical margin of cell 2m+1a distinctly longer than vein 2A; cell 2a only ca 3× as long as wide; ♂ abdominal venter with 2 (1+1) large oblique plates nearly as wide as head and lying anterolaterally to urogenital openings ................................................................. nigrita
   Apical margin of cell 2m+1a distinctly shorter than vein 2A; cell 2a not less than 5× as long as wide; ♂ abdominal venter either lacking above described plates or they are less than 1/2 as wide as head................................................................. 2

2. Wing evenly narrow, ca 3.7× as long as wide, intermediate section of posterior margin almost straight and parallel to anterior margin; ♂ tergite 3 hardly shorter than scutellum; ♂ abdominal venter lacking extra plates anterolaterally to urogenital openings, but pregenital plate large and well sclerotized .................................................. leptoptera
   Wing normal in shape, ca 3× as long as wide, intermediate section of posterior margin distinctly convergent apicad to anterior margin; ♂ tergite 3 not more than 1/2 as long as scutellum; ♂ abdominal venter with 2 (1+1) large plates anterolaterally to urogenital openings, pregenital plate indistinct......................... modesta

Phthona modesta (Maa) Fig. 5, 167.

Lynchia modesta Maa, 1963: 166, fig. 44, 46, 48, 50, 52, 53, ♂♀. Type: ♂ (AMS), ex Microhierax fringillarius, Sumatra.

Material: 4♂♂, 2♀♀. THAILAND: 1♀, Satun, Muang Thung Nui, ex M. fringillarius, WS 482, X.1963, Wanit Songprakob. 1♂, 1♀, Songkhla, Nathawi, ex M. fringilla-
Habitats. Malaysian Subregion, lowland; at present, known from Peninsular Thailand, Sumatra and Java. On Microhierax fringillarius.

Systematics. On bases of the shape of wing and ♀ genitalia, this species is here considered the most generalized of the genus. Even so, the size reduction of tergite 3 and the presence of sublateral plates on abdominal venter clearly indicate modesta already having strongly deviated from the ancestral stock of the genus. The tarsal-spine formula is 2.1.1.0/2.1.1.0/8(6+2).2.2.1 in ♀ and 2.2.1.0/2.1.1.1/6(4+2).2.2.1 in ♂. The palpus and prosternum are as in fig. 5 and 167, respectively.

**Phthona nigrita** (Speiser) Fig. 5, 169–171.


Ornithoponus sartus Ferr., 1925b: 333, fig. 3, 4, ♀ ♂. Type: ♀, (UCB), ex Microhierax erythrogenys, Samar, Philippines.

Material. 9♂♂, 10♀♀. **PHILIPPINES**: 1♀, 1♂, Balang-Balang, Mt Hilong-Hilong,
Fig. 162. *Icosta (Rhyponotum) pilosa* Mcq., Sudan, ♂ abdomen including genitalia.


Habitats. Philippine Subregion, lowland; at present, known from Luzon, Samar and Mindanao. On *Microhierax erythrogenys*, with stray records from Coraciiformes: Bucerotidae (*Buceros [=Hydrocorax]*) and Passeriformes: Dicuridae (*Dierurus*). Highest density per infested bird was 2♂♂, 1♀ (SU-BBM 1250).
**Systematics.** Although possessing several outstanding characters, *nigrita* is closer to *modesta* than to *leptoptera*. The strongly sclerotized plates on ♀ abdomen do not conform with those found in any generalized hippoboscids. Their presence is here considered a specialized character. The dorsal sclerite embracing spiracle 5 probably represents partial consolidation of both tergites and laterites of abdominal segments 4 and 5, whereas the sublateral plates on venter are in turn, largely if not entirely, a consolidation of sternites 4 and 5. These 2 pairs of huge sclerites are apparently a compensation for the size reduction and wide median interruption of tergite 6, as well as an adaptation to the shifting forward of urogenital openings. The strong bristles forming posterior fringes of those sublateral plates obviously serve to protect those openings. The apical margin
of cell $2m+1a$ in $2\delta$ examined is hardly concavely curved, or not distinctly so; and the sublateral plates in $1\varphi$, probably somewhat teneral, are much paler than other abdominal sclerites. From Speiser's inadequate description, Ferris (1927c: 228) surmised that nigrita might be the same as his setosa. The tarsal spine formula is $2.2.1.0/2.2.1.0/6(3+3).2.2.2$ in $\varphi$. The palpus, prosternum and $\varphi$ genitalia are as in fig. 5, 169–171, respectively.

Fig. 172-178. Interpretation of Weyenbergh's description of Lynchia. 172, Stilbometopa ramphastonis Ferr., head and thorax; 173, Icosta americana Lech., head and thorax; 174, Ornithomya viridis Latr. [= avicularia Linn.], head; 175, Icosta americana, wing, notations mine; 176, Stilb. impressa Bigot, basal part of wing, traced from enlarged photograph; 177, Stilb. ramphastonis, wing; 178, Ornith. avicularia, wing, with Weyenbergh's venational terminology. Fig. 172 & 177 redrawn from Ferris 1930c; 173, redrawn from Ferris 1927a; 174 & 178, redrawn and enlarged from Meigen 1830.
Phthona leptoptera (Maa) Fig. 5, 12, 168.

Lynchia leptoptera Maa, 1963: 168, fig. 45, 47, 49, 51, 54, 55, ♀♂. Type: ♀ (CNHM), ex Microhierax caeruleus, Thailand.

Material. 1♂, 4♀♀. ASSAM: 1♀ (BMNH), Mungpoo, ex M. eutolmus, III.1920, Senior-White. BURMA: 1♂, 1♀ (MCZ), Myitkyina, ex bird zB44, III.1945, Stager. TONKIN: 2♀♀ (MCZ), 1 w. mites on abd., Muong Moun, ex M. melanoleucus z772, 892, V. T.

Habitats. Indo-Chinese Subregion; at present, known from Assam, Burma, Thailand and Tonkin. On Microhierax spp. The type host, not mentioned in the original description, was M. caeruleus (RE 2958).

Systematics. The strongly shortened thorax and narrowed wing of leptoptera are characters unique for Icosta-complex. The anterior thoracic spiracle and scutellum are noticeably smaller than in modesta and nigrita. These are linked with the shortening of the thorax as a whole, whereas the reduction of strong bristles on ♀ tergite 6, with the shifting forward of urogenital openings. In other features, including the short and postero-laterally produced syntergite 1+2 as well as the medially narrowly interrupted ♀ tergite 6, the abdomen is more closely similar to most species of the genus Icosta than to modesta and nigrita. The ♀ genitalia appears to be less generalized than in the 2 latter species. The tarsal-spine formula is 2.1.0/2.1.0/8(6+2).3.2.2 in ♀. The palpus, hind tibia and prosternum are as in fig. 5, 12 and 168, respectively.

HOST RELATIONSHIPS

Bequaert (1953: 213-336) has discussed various phases of host relationships of Hippoboscidae, and listed 136 genera of birds as hosts of the following Icosta species: albipennis [=albipennis + ardea ardea + ardea botaurinorum], americana, angustifrons, bicorna, dukie, fusca [=americana], holoptera, longipalpis, maquilengensis, massonnati, nigra, pilosa, politiciques [=chalcodocha + trita], samoana, sarita [=nigrita], schoutedeni, simplex [nee Wk., =australica], tuberculata, woletti [=rufiventris]. In his 1955a, 1957 papers, detailed records for all American species were enumerated and analyzed, and 10 additional bird genera were included as hosts of Icosta. Though still far from complete, more information is now available, and it seems worthwhile to review certain aspects of this problem. The terms “breeding” and “accidental” in the discussions given below and given under each species in the taxonomic account are understood to be by presumption, and the latter term includes stragglers, contaminations and mislabelings.

Over-all Host Range of Icosta and Phthona

Up to now, 263 genera of birds in 18 orders and 61 families are known as hosts of various Icosta and Phthona species. There is no record for Struthio-, Procellarii- Podicipi-, Gavii-, Rhei-, Casuarii-, Sphenisci- and Apterygiformes; the odd records for Tinami-, Anseri-, Charadrii-, Caprimulgi, Apodi- and Trogoniformes should most probably be considered accidental; and only about 27 families in 12 orders serve as true breeding hosts. A concise list of different Icosta and Phthona species under each bird genus is in Appendix I, that under each bird order is given below.

TINAMIFORMES (Tinamidae). Accidental: holoptera (Albipennis group) and plau-
manni (Simplex group), 1 single record each.


**FALCONIFORMES** (Accipitridae, Falconidae, Pandionidae, Cathartidae). Diurnal birds of prey; nests loose but fairly durable, often in trees or in lofty aeries, occasionally (in Microhierax) in hollowed trees. Breeding: *americana, angustifrons, dukei, nigra, rufiventris* (Americana group); *zumpti* (Simplex group); *chalcolampra* (Plana group); *longipalpis, mecorrhina* (Longipalpis group); *meda* (Meda group); *leptoptera, modesta, nigrita* (Nigrita group). Accidental: *albipennis, ardeae, botaurinorum* (Albipennis group); *fenestella* (Plana group); *bucerochina* (Longipalpis group). Status uncertain: *suaensis* (Americana group).

**GALLIFORMES** (Megapodiidae, Cracidae, Phasianidae, Meleagridae). Ground birds, often gregarious; nests crude, usually on ground. Breeding: *americana* (Americana group); *australica, maquilingensis, plaumanni, simplex* (Simplex group); *hirsuta* (Hirsuta group). Accidental: *zumpti* (Simplex group); *chalcolampra, fenestella* (Plana group); *pilosa* (Pilosa group). Status uncertain: *humilis, subdentata* (Longipalpis group).

**GRUIFORMES** (Eurypygidae, Rallidae, Otididae). Semiaquatic and ground birds; nests loosely constructed on ground in dry or damp environment. Breeding: *holoptera, omnisetosa* (Albipennis group); *pilosa* (Pilosa group). Accidental: *albipennis, ardeae* (Albipennis group); *maquilingensis* (Simplex group).

**CHARADRIFORMES** (Jacanidae, Charadriidae, Laridae, Alcidae). Accidental: *albipennis, ardeae, omnisetosa, sp. "O"* (Albipennis group); *americana, angustifrons* (Americana group).

**COLUMBIFORMES** (Pteroclidae, Columbidae). Ground birds; nests crude, above ground, often in trees or on rocky ledges. Breeding: *simplex* (Simplex group); *chalcolampra* (Plana group). Accidental: *americana* (Americana group); *fenestella, plana* (Plana group); *dioxyrhina* (Longipalpis group); *pilosa* (Pilosa group).

**PSITTACIFORMES** (Psittacidae). Arboreal, often gregarious; nests in hollowed trees either by digging themselves or by modifying nests deserted by woodpeckers, etc., usually no nesting material inside, only wood fragments. Breeding: *papulata, parallelifrons, paramonovi* (Parallelifrons group); *chalcolampra, wenzeli* (Plana group). Accidental: *angustifrons* (Americana group); *maquilingensis* (Simplex group); *fenestella, plana* (Plana group); *tuberculata* (Longipalpis group). Status uncertain: *suaensis* (Americana group).

**CUCULIFORMES** (Musophagidae, Cuculidae). Arboreal; nests fairly finely constructed, above ground, some species parasitic in other birds’ nests. Breeding: *zumpti* (Simplex group); *sensilis* (Minor group); *chalcolampra, elbeil, recessa* (Plana group). Accidental: *dukei, nigra* (Americana group); *maquilingensis, simplex* (Simplex group); *wenzeli* (Plana group); *mecorrhina* (Longipalpis group). Status uncertain: *latifacies* (Americana group); *subdentata* (Longipalpis group).
STRIGIFORMES (Strigidae). Nocturnal birds-of-prey; nests usually very dirty, in hollowed trees, many species build their own nests of twigs in the hollow. Breeding: americana, rufiventris (Americana group). Accidental: albipennis (Albipennis group); angustifrons, nigra (Americana group); zumpti (Simplex group); chalcokampra, fenestella (Plana group); longipalpis (Longipalpis group).

CAPRIMULGIFORMES (Caprimulgidae). Accidental: ardea (Albipennis group), mecorrhina (Longipalpis group), 1 single record each.

APODIFORMES (Apodidae). Accidental: zumpti (Simplex group), 1 record.

TROGONIFORMES (Trogonidae). Accidental: angustifrons (Americana group), 1 record.

CORACIIFORMES (Coraciidae, Alcedinidae, Meropidae, Momotidae, Bucerotidae). Habits much varied, some nesting in tunnels on banks of rivers or in termitaria or in hollowed trees. Breeding: jactatrix (Plana group); bicorna, bucerotina, coalescens, dioxyrhina, spinosa (Longipalpis group). Accidental: ardea (Albipennis group); minor (Minor group); angustifrons (Americana group); maquilgingensis (Simplex group); chalcokampra, wenzeli (Plana group); mecorrhina (Longipalpis group); nigrita (Nigrita group).

PICIFORMES (Picidae, Ramphastidae, Capitonidae). Arboreal; nests usually above ground, often in hollowed trees. Breeding: trita (Plana group). Accidental: americana, angustifrons (Americana group); maquilgingensis (Simplex group); fenestella (Plana group).

PASSERIFORMES (Eurylaimidae, Irenidae, Nectarinidae, Formicariidae, Pittidae, Cotingidae, Hirundinidae, Pycnonotidae, Campephagidae, Muscicapidae, Motacillidae, Lamidae, Meliphagidae, Thraupidae, Fringillidae, Ploceidae, Sturnidae, Oriolidae, Picidae, Corvidae, Cracticidae, Ptilonorhynchidae, Paradisaeidae). Habits much varied, largely arboreal, often feeding on ground; nests finely constructed, above ground. Breeding: minor, lonchurae, reducta, sensilis (Minor group); chalcokampra, fenestella, volana, tarsata (Plana group); acronialis, corvina, tuberculata (Longipalpis group). Accidental: albipennis, holopiera (Albipennis group); americana, angustifrons, samoana (Americana group); pluvannami (Simplex group); hisruta (Hirsuta group); trita, wenzeli (Plana group); bicorna (Longipalpis group); nigrita (Nigrita group). Status uncertain: diluta (Plana group).

Degree of Host Specificity

The host specificity in ectoparasites can usually be measured by analysis of positive records, count of infestation frequency and infestation density, and implication of evolutionary parallelism with due consideration to vagaries of collecting. Of a given species, when available host records are too scanty and at the same time systematic affinities are not quite clear, its host specificity cannot be or can hardly be ascertained. This is the case for Icosta diluta, humilis, latifacies, massonnati, subdentata, suvaensis and tripeltia. The remaining species fall into 4 categories, as follows.

Monoxenous (11 species): australica on Alectura (Megapodiidae), corvina on Corvus (Corvidae), dioxyrhina on Rhyticeros (Bucerotidae), lepiotiera on Microhierax (Falconidae), lonchurae on Lonchura (Ploceidae), modesta on Microhierax (Falconidae), nigrita also on Microhierax, parallelifrons and paramonovi on Cacatua (Psittacidae), tarsata on Myiophonus (Muscicapidae), trita on Megalaiana (Capitonidae). Among these, australica, corvina and tarsata may in the future prove to be oligoxenous.

Pleioxenous (5 species): *acromialis* on Sturnidae, Corvidae (Passeriformes), *fenestella* on Corvida, Dicruridae, Muscicapidae (Passeriformes); *nigra* on Accipitridae, Falconidae (Falconiformes); *plana* on Paradisaeidae, Cracticidae, Ptilonorhynchidae (Passeriformes); *plaumanni* on Cracidae, Phasianidae (Galliformes).

Polyxenous (8 species): *americana* on Strigidae (Strigiformes), Accipitridae (Falconiformes), Phasianidae (Galliformes); *angustifrons* on Accipitridae, Falconidae (both Falconiformes), Strigidae (Strigiformes), Ramphastidae (Piciformes); *chalecolampa* on Accipitridae (Falconiformes), Psittacidae (Psittaciformes), Columbidae (Columbiformes), Cuculidae (Cuculiformes), Sturnidae, Corvidae (both Passeriformes); *minor* on Ploceidae, Laniidae, Muscicapidae (all Passeriformes), Cuculidae (Cuculiformes); *rufventris* on Accipitridae (Falconiformes), Strigidae (Strigiformes); *sensilis* on Cuculidae (Cuculiformes), Muscicapidae (Passeriformes); *simplex* on Columbidae (Columbiformes), Megapodiidae (Galliformes); *zumpti* on Musophagidae (Cuculiformes), Accipitridae (Falconiformes).

In the above list it may be noted that: (a) mono- plus oligoxenous species much outnumber pleio- plus polyxenous species, about in the ratio of 7 to 3; (b) among mono- and oligoxenous species, 11 are on arboreal birds, 12 on aquatic and semi-aquatic birds, 12 on birds nesting in hollowed trees, 3 on terrestrial birds; (c) no aquatic, semiaquatic and hollowed-tree nesting birds (with possible exception of bucerotids harboring *mecorhin*) serve as breeding hosts of pleio- and polyxenous flies; (d) among the 10 species of *Icosta* known to breed on Accipitridae, 3 are oligoxenous, 1 pleioxenous, 6 polyxenous but none monoxenous.

Infestation Frequency, Population Density

From the very scanty data thus far available, the infestation frequency in *Icosta* shows significant variation with seasons, localities and kinds of birds (even those belonging to same preferred family). Thus:

*I. americana*. In New York State, June to August, 22% of 147 young *Bonasa* and in Connecticut, October to November, 50% of 36 adult *Bonasa* were found infested (Beq. 1953: 232, 1955a: 294). Of the 518 and 28 verified Nearctic and Neotropical records, respectively, 28% and 22% were from Falconiformes and 17% and none, from Galliformes (Beq. 1955a: 293-95).

*I. ardea* botaurinorum plus *I. albipennis*. In temperature North America, most flies were collected from May to September, a few in April and October, none from mid December to March (Beq. 1955a: 340).
I. fenestella. In Taiwan, December to April, 19% of 234 Dendrocitta and 58% of 26 Urocissa were found infested (both birds belong to Corvidae) (Maa et al. 1965: 397-99, as Lynchia sp. “P”).

I. hirsuta. In Chiles Valley, California where collection records were available on an annual basis, there was a complete absence of flies from January to May, and the peak months for fly appearance were from August to October (Furman et al. 1953 J. Parasit. 39: 70).

I. lonchurae. In Taiwan, December to April, 27% of 22 Lonchura were found infested (Maa et al. L.c., as Lynchia sp. “L”).

I. maquilgingensis. In Taiwan, December to April, 31% of 13 Arborophila, 36% of 53 Bambusiecola, 20% of 10 Hierophasis, none of 13 Exulfactoria were found infested (all birds belong to Phasianidae). And in Bambusiecola, the infestation rates for SW, SE and central Taiwan were 62%, 23% and 27% respectively (Maa et al., L.c.).

I. trita. In Taiwan, December to April, 26% of 259 Megalaima were found infested (Maa et al. L.c.).

The average density of Icosta is about 2 flies per infested bird. It is, therefore, lower than in Ornithoica and Ornithomya. In general, this density is also lower on accidental and small-sized hosts than on breeding and large-sized ones and when records are not too scanty and are based on proper collecting methods, the highest density in each species of flies is to be found only on breeding hosts. Available records of highest density of the various species are: acromialis, 7 flies on a Corvus; americana, 61± flies on a Bubo and 15 flies on a Bonasa; buceroalina, 4 on Anorhinus and on Rhyticerus; chaleolampra, 6 on Probosceiger and 4 on Corvus; dioxyrhina, 4 on Rhyticerus; dukei, 10 on Haliaeetus; elbeli, 14 on Centropus; fenestella, 8 on Urocissa; lonchurae, 3 on Lonchura; longipalis, 4 on Spilornis; maquilgingensis, 10 on Gallus and 7 on Hierophasis; meda, 7 on Torgos; nigrita, 3 on Microhierax; parallelifrons, 9 on Cacatua; plana, 3 on Cracticus; sensilis, 3 on Cuculus; simplex, 3 on Talegalla; trita, 5 on Megalaima.

The population density of a given Icosta species may also be affected by its association with other hippoboscids on same individual birds. In such cases, the mono- or oligoxenous species usually outnumber pleio- or polyxenous species if the bird involved is a preferred host of that particular fly. Multiple infestation is usually an uncommon phenomenon, unless 2 or more oligoxenous species coexist on a certain bird in the same area. Of 194 infested birds of Lophortyx californica in California, 36% were found harboring both I. hirsuta and Stilbometopa impressa Bigot, both of which are specific on Phasianidae. In another unusual case, on a Cracticus cassicus (BBM-NG 29567) in New Guinea, found together were 1 fly each of I. plana, Ornithoica zamiera Maa, O. stipturi Schin. and Ornithophila metallica Schin. plus 2 flies of Ornithoica exilis Wk. Other cases of multiple infestation so far published (Beq. 1953: 224; Maa 1966 Pacif. Ins. Monogr. 10: 115; Maa et al. 1965: 400) are less complicated. Thus:

I. angustifrons. Associated with I. rufiventris plus Ornithoctona erythrocephala Lch., on Hypomorphus, 1 case.

I. chaleolampra. Associated with Ornithoica exilis plus Ornithophila metallica, 1 case; with O. exilis plus O. stipturi, 1 case; with O. exilis alone, 11 cases; with O. stipturi, 3 cases; with O. zamiera, 1 case.
I. fenestella. Associated with O. metallica, on Dendrocitta and Urocissa, 2 cases each.
I. parallelifrons. Associated with O. exilis, on Cacatua, 3 cases.
I. plana. Associated with O. exilis plus O. stipituri, 1 case; with O. exilis alone, 1 case;
with O. stipituri alone, 3 cases.
I. simplex. Associated with O. exilis, on Talegalla, 1 case.
I. rufiventris. Associated with Ornithoctona erythrocephala, on Micrastur, 1 case.

Host Habits and Habitats

In theory, the host relationship of a bird lousefly is governed by the degree of com­petition among parasites, ability of a host bird to get rid of its parasite(s), appropriateness of host blood as a nutrient for adult fly (and its developing larva), appropriateness of host plumage as a shelter for adult fly as well as appropriateness of host nesting site as a shelter for development of fly-pupa. It is, therefore, not surprising that closely related flies usually have similar patterns of host relationship, and that flies emerging from highly specialized ecological niches such as hollowed tree are usually highly specific in host relationship and even highly specialized in structure. These are particularly true for Icosta and Phthona. The absence of any host specific species of these 2 genera breeding on Struthioni-, Tinami-, Procellarii-, Caprimulgi-, Apodi- and Trogoniformes is at least partly due to competition of hippoboscids of other genera, viz., Struthiobosca, Microlynchia, Olfersia, Pseudolynchia, Crataerina, Myophthiria, and Ornithoctona respectively. The absence on Podicipi- and Charadriformes is apparently due to the poor adaptability of these flies to marine life; that on Gavili- and Sphenisciformes, due to their incapability to survive in polar areas and to the nature of host plumage; that on Anseriformes, due to the oily short plumage, damp nesting sites and almost instant-lasting nesting period of those birds. The absence on Rhei-, Casuarii- and Apterygiformes, merely by guessing, is perhaps something related to the geological history of such birds. The nature of host blood, which is closely linked to phylogenetic affinities of different orders, families and genera of birds, obviously does not play a very important role in Icosta and Phthona. If the order, families etc., of birds are temporarily set aside, the various Icosta and Phthona species may arbitrarily be segregated into 6 ecological categories; and under each category, if occasional hosts frequenting similar natural habitats as those of breeding hosts are taken out of the list, it will leave but few true stragglers including contaminations. In such a way, the host range and host preference of the species can more easily be explained. The categories are as follows.

(a) On birds frequenting swamps and similar environments. 12 species and subspecies, probably all oligoxenous, belonging to Albipennis and Pilosa groups. 270± available host records, 4% of which were stragglers.

(b) On birds nesting in hollowed trees and similar sites. 12 species, 7 mono- and 5 oligoxenous, belonging to Parallelifrons, Nigrita, Plana and Longipalpis groups. They are bicorna, bucerotina, coalescens, dioxyrhina, lepioptera, modesta, nigrita, papulata, parano­novi, parallelifrons, spinosa, trita. 146 available host records, 4% of which were stragglers.

(c) On terrestrial birds. 5 species, 1 mono-, 2 oligo-, 1 pleio- and 1 polyxenous (perhaps the monoxenous one is actually oligoxenous), belonging to Simplex and Hirsuta groups. They are australica, hirsuta, maquilingensis, plaumanni, simplex. 176 available host
records, 12% of which were stragglers.

(d) On birds of prey. 8 species, 4 oligo-, 1 pleio- and 3 polyxenous, belonging to America, Simplex, Longipalpis and Meda groups. They are angustifrons, dukei, longipalpis, meccorrhina, meda, nigra, rufiventris, zumpti. 213 available host records, 9% of which were stragglers including “live” contaminations (preys).

(e) “Highly” polyxenous species, on birds of prey, etc. 2 species, both very widely distributed, belonging to Americana and Plana groups. They are americana, chalcolampra. 670 available host records, 2% of which were stragglers.

(f) On birds making fine above-ground nests. 14 species, 2 mono-, 6 oligo-, 4 pleio- and 2 polyxenous, belonging to Minor, Plana and Longipalpis groups. They are aeronalis, cornina, elbeli, fenestella, jactarix, lonchuriae, minor, plana, recessa, samoana, sensilis, tarsata, tuberculata, wenzeli. 257 available host records, 3% of which were stragglers.

(g) Host relationships uncertain. 7 species, belonging to Americana, Minor, Plana and Longipalpis groups. They are diluta, humilis, latifacies, subdentata, suvaensis, tripelia, sp. “W”. 8 available host records.

Of the stragglers, category (a) had 8, (b) had 1, (f) had 2 records ex birds of prey which might possibly have been “live” contaminations as a sequence of preying by those predators. The other straggler records were: category (a), Pteroclididae, Bucerotidae and Thraupidae, 1 each; (b), Columbidae, Pyconotidae, Ploenidae, Dieruridae and Cracitididae, 1 each; (c), Tinamidae 1, Ardeidae 2, Rallidae 1, Capitonidae 1, Bucerotidae 1, Psittacidae 2, Cuculidae 3, Formicariidae 1, Muscicapidae 2, Fringillidae 6, Corvidae 1; (d), Ramphastidae 6, Bucerotidae 3, Musophagidae and Corvidae, 2 each, Charadriidae, Psittacidae, Trogonidae, Momotidae, Cotingidae and Muscicapidae, 1 each; (e) Corvidae 5, Phasianidae, Picidae and Fringillidae, 1 each; (f), Columbidae 2, Bucerotidae, Phasianidae and Picidae, 1 each. Noteworthy was the entire absence of records from birds of prey in category (c), from aquatic and semiaquatic birds in (d), (e) and (f), and from hollowed-tree nesting birds in (b).

The very short palpi and very dense pilosity on legs and wings in category (a) are possibly related to the nature of plumage and habitats of aquatic and semiaquatic birds; the enlarging of anterior thoracic spiracles, the reduction of eyes and wings and the very dull pattern of body in category (b), obviously adaptations to the dull, seclusive, poorly ventilated nesting sites of their hosts; and the presence of complete or vestigial ocelli in category (c) is possibly an adaptation to the open nests of their hosts. In categories (d), (e) and (f), there are various forms of structural speciations which have developed to various extents to adapt to respective habitats of different hosts.

Since birds of the same order or family may serve as breeding hosts of several unrelated Icosta species and since more generalized birds do not necessarily serve as breeding hosts of more generalized Icosta, the hypothesis of host-parasite evolutionary parallelism appears not quite applicable to the entire genus. This may be attributed to the probability that the evolutionary deviations in Icosta have been more profoundly effected by ecological factors than that in its hosts birds. On the other hand, there are several pairs or series of Icosta species clearly demonstrating host-parasite evolutionary parallelism in a subgeneric scale. Members of respective pairs or series are closely related to one another and have similar or nearly identical patterns of host relationships. This phenomenon is also correlated to the vicariism (see chapter on Distributional Pattern).
It is exemplified by: *ardeae* vs *albipennis*, *modesta* vs *nigrita* vs *leptoptera*, *dukei* vs *nigra*, *parallelifrons* vs *paramonovi* vs *papulata*, *minor* vs *lonecureae* vs *sensilis*, and *bucerotina* vs *dioxyrhina* vs *coalescens* vs *bicorna*. The extreme of this phenomenon resulted the splitting of a given species such as *ardeae* and *aenoniulis*, into geographic forms.

As mentioned, birds unrelated to a breeding host but frequenting habitats similar or nearby to that of the latter may harbor flies normally breeding on that particular host. The occurrence of flies on such unrelated birds often attains a fairly high percentage of host records which thus obscures the true picture of host relationship of the fly-species in question. Since ecological factors affect both hosts and parasites, birds living under similar environments may more or less exhibit evolutionary convergence with regard to their plumage and certain other adaptative features. Meanwhile, the non-breeding hosts, under certain circumstances, may serve as alternate or secondary hosts of that fly-species. For instance, records are available for *Icosta albipennis* plus *ardeae* ex different kinds of aquatic and semi-aquatic birds viz., Ardeidae, Threskiornithidae, Ciconiidae, Anatidae, Charadriidae, Eurypygidae, Railidae, Jacanidae and Laridae. These 2 *Icosta* species normally breed on the Ardeidae but possibly also use one or more of the above enumerated bird-families as secondary hosts. Unfortunately there are no rearing records to confirm or disconfirm this possibility.

### DISTRIBUTIONAL PATTERN

#### Distributional Ranges

*Icosta* is almost cosmopolitan. Its northern- and southernmost limits, so far recorded, are 59° N in Sweden (*ardeae ardeae*), 49° N in Canada (*americana*), 35° S in South Australia (*paramonovi*), and 30° S in Argentina (*americana*) and SE Brazil (*albipennis*). This more northerly extension in distribution is largely due to higher average temperature in the Northern than Southern Hemisphere and is also a feature in many north-south widely distributed individual species. For instance, *albipennis* extends from 50° N to 30° S; *ardeae ardeae*, from 59° N to 25° S; *americana*, from 49° N to 30° S; *angustifrons*, from 46° N to 27° S; *nigra*, from 57° N to 28° S; *rufiventris*, from 46° N to 27° S. Most probably these extreme limits were largely if not entirely based upon warm season records, and the breeding-season range of the genus as a whole and that of individual species are not so extensive. Of the various species, less host-specific ones and those breeding on long distance migratory birds such as *americana*, *nigra*, *dukei*, *chalcolampra*, have much wider distributional ranges, and in different countries in different seasons they may have different preferred hosts. A result is that the distributional range of a given parasite may be wider than that of its host. On the contrary, the highly host-specific species, being inadaptable or poorly adaptable to adverse and/or varied environments, have much more limited or sporadic distribution than their breeding hosts.

**Continental vs Oceanic**

Apparently *Icosta* is poorly adaptable to marine life and is almost entirely absent in small islets and atolls. There are only a few odd records of *albipennis* from Bahama Is., Cuba, Jamaica, Puerto Rico, Galapagos; *ardeae ardeae* from Mariana Is.; “*dioxyrhina*” from Grande Comore Is.; *nigra* from Jamaica, Galapagos, Hawaii; “*pilosa*” from Reunion
Is.; samoana from Samoa and suvaensis from Fiji. Besides nigra, samoana and suvaensis, it is doubtful whether or not those records are reliable and whether or not those species are permanently established. No Icosta species other than ardeae are known to occur in New Zealand and Madagascar. The occurrence of nigra in Hawaii is possibly a rather recent introduction (earliest record is 1845). If so, it is a case unique for Icosta.

Distributional Centers

The present day distributional center of Icosta is obviously in the Oriental Region where more than half of the species of the genus, including many endemities, occurs. In the evolutionary past, however, the primary distributional center has probably been in the Ethiopian Region. This is evidenced by that even at present, it has more infrageneric groups than any other Region and has a good number of endemic species (Table 4), and its representatives for different infrageneric groups are as a rule more generalized than counterparts from other Regions (see chapter on Evolutionary Trends). The Nearctic and Neotropical Regions, the former in particular, have a much poorer fauna with a few endemic species and no endemic infrageneric groups. Neither do the Palaeartic and Australian Regions have endemic infrageneric groups, and both are practically attenuations of the Oriental fauna; the former has no endemic species and the latter has only a few. Interregional faunal affinities are most significant in Oriental vs Ethiopian and in Neartctic vs Neotropical, and in each case, there are involved a number of species and infrageneric groups common to both Regions. Affinities of Palae- and Nearctic Regions, not as in many other groups of animals and plants, are quite insignificant and have only one species (ardeae) in common. This may perhaps be attributed to the fact that Icosta is basically tropical and subtropical. Affinities of the Oriental vs Palaeartic and Australian Regions, as explained above, are almost equally insignificant. In the Southern Hemisphere, affinities of Ethiopian vs Neotropical are distinctly stronger than

Table 4. Number of species and subspecies of Icosta endemic in different regions (non-endemic forms in parentheses).

<table>
<thead>
<tr>
<th>Region</th>
<th>Americana</th>
<th>Hisuta</th>
<th>Minor</th>
<th>Parallelofros</th>
<th>Simplex</th>
<th>Plana</th>
<th>Longipalpis</th>
<th>Albipennis</th>
<th>Meda</th>
<th>Pilosa</th>
<th>Total no. of species</th>
<th>Total no. of groups</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>1(1)</td>
<td>3</td>
<td>8</td>
<td>1(1)</td>
<td>-</td>
<td>-</td>
<td>25(3)</td>
<td>-5</td>
</tr>
<tr>
<td>Ethiopian</td>
<td>1</td>
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<td>1(1)</td>
<td>4</td>
<td>3(1)</td>
<td>-1(1)</td>
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<td>12(3)</td>
<td>1(8)</td>
</tr>
<tr>
<td>Australian*</td>
<td>1(1)</td>
<td>1</td>
<td>1(1)</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>2(1)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6(3)</td>
<td>-5</td>
</tr>
<tr>
<td>Neotropical</td>
<td>1(4)</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-2(2)</td>
<td>-</td>
<td>-</td>
<td>2(6)</td>
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</tr>
<tr>
<td>Palaeartic</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2(1)</td>
<td>-1(1)</td>
<td>-</td>
<td>-</td>
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<td>-3</td>
</tr>
<tr>
<td>Nearctic</td>
<td>-4(4)</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>1(2)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2(6)</td>
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<td>Total</td>
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<td>11</td>
<td>12</td>
<td>13</td>
<td>1</td>
<td>1</td>
<td>60</td>
<td>10</td>
</tr>
</tbody>
</table>

* Incl. Hawaii, Samoa and Fiji.
those of Australian vs Neotropical Regions. The former is demonstrated by dukei vs nigra, ardeae vs albipennis and zumpti vs plauamani, each pair of which occurs side by side across the Atlantic Ocean. It is interesting to note that none of the various Subregions of the same Regions (except, perhaps the Papuan and Philippine of the Oriental) is well definable in its Icosta fauna.

Faunal List of Regions

In the following list, species and subspecies at present known to be endemic to a particular zoogeographic Region are in roman, non-endemic ones are in *italics*; species of *Puthona* n. gen. are in brackets.

**ORIENTAL REGION.** acromialis, ardeae, australica, bicorna, bucerotina, chalcolampra, corvina, diluta, dioxyrhina, elbeli, fenestella, jactatrix, [leptoptera,] lonchurae, longipalis, maquilingensis, meda, [modesta, nigrita,] omnisetosa, papulata, *parallellifrons*, plana, reducta, sensilis, simplex, spinosa, tarsata, trita, tuberculata, wenzeli.

**ETHIOPIAN REGION.** ardeae, coalescens, dukei, humiliis, mecorrhina, meda, minor, pilosa, recessa, schoutedeni, subdentata, tripelta, zumpti, sp. “O”, sp. “T”.

**PALAEARCTIC REGION.** ardeae, massonnati, meda, minor, reducta (?) sp. “F”.


**NEOTROPICAL REGION.** albipennis, americana, angustifrons, *holoptera*, latificacies, nigra, plauamanni, rufiventris.

**NEARCTIC REGION.** albipennis, americana, angustifrons, botaurinorum, hirsuta, *holoptera*, nigra, rufiventris.

Distributional Overlapping

The high frequency of overlapping and vicariism (geographic replacement) in closely related species is one of the significant features in the distributional pattern of Icosta. The extent of overlappings varies with species and probably with seasons also, and the preferred hosts of the species involved are usually closely related, very occasionally the same bird-species. In americana, angustifrons and rufiventris, insofar as known, their overall northern- and southernmost limits extend from 49° N to 30° S and their overlapping area, from 46° N to 27° S. Several bird-genera such as *Accipiter, Buteo, Leucopternis* and *Micrastur* are known as hosts of all these Icosta species, and many other bird-genera are known as hosts of 2 of the 3 species (see Appendix I). Coexistence of 2 or 3 of these Icosta species on the same individual birds, if it ever occurs in nature (no published records), must be quite rare since there seems to be a delicate balance in regional population density, host preference and interspecific competition amongst these species. This is demonstrated by several examples. In Canada and the U.S.A. where *ardeae* botaurinorum and *albipennis* extensively overlap each other, the former species is almost entirely confined to *Botaurus*, while the latter chiefly breeds on *Ardea, Butorides, Florida, Ixobrychus, Leucophoyx* and *Nycticorax*. Among the 200± examined specimens of these Icosta species, I could find only 2 and 1 botaurinorum ex *Ixobrychus* and *Nycticorax*, respectively, and not a single specimen of *albipennis* ex *Botaurus*. In Australia, *parallellifrons* and *paramonovi* slightly overlap each other. They are confined to *Cacatua galerita* and C.
roseicapilla, respectively, and the coexistence of the 2 species on the same individual birds is thus largely if not entirely ruled out.

Geographic Replacement.

The vicariism or geographic replacement in Icosta is more often by the flies themselves rather than by their breeding hosts, i.e., the distributional ranges of flies more often exceed that of birds than vice versa. This is perhaps correlated to the possibility that in the past the evolutionary deviation speed of flies has been higher than that of birds, or that an ecological factors have had a more profound effect on the flies than on the birds. Examples of various types of replacements are given below. Cosmerodius a. albus, C. a. melanorhynchus and C. a. modestus serve as breeding hosts of Icosta a. ardeae in the Old World, whereas C. a. egretta serves as that of I. albipennis in the New World; Nycticorax n. nycticorax, as that of I. a. ardeae in the Old World, too, but N. n. hoactli, as that of I. a. botaurinorum in the Nearctic as well as of I. albipennis in the Neotropical Region; Rhyticeros plicatus ruficollis and Rh. p. subruficollis, as that of I. dioxyrhina in the Papuan Subregion and of I. buceotina in the Indo-Chinese Subregion, respectively; Corvus m. macrorhynchos and C. m. philippinus, as that of I. corvina in the Indian plus Indo-Chinese Subregions and of I. parallelifrons tuberculata in the Philippine Subregion, respectively, while C. orru in New Guinea and New Britain as well as C. woodfordi in the Solomon Is. both serve as that of I. p. parallelifrons; Rallus striatus in Malaya as well as R. pectoralis in New Guinea both as that of I. holoptera omnistosa, while R. limicola in Wisconsin, as that of I. h. holoptera; Microhierax eutolmus in Assam, M. caerulescens in Thailand as well as M. melanoleucus in Tonkin, all as that of I. lepontera. In a broader sense of the term “replacement”, each pair of dukei vs nigra, ardeae vs botaurinorum, ornistosa vs holoptera, and many other non-overlapping closely allied forms has its 2 involved counterparts found side by side in 2 proximate or remote countries.

PHORESY, HYPERPARASITISM

The phenomena of mallophagan phoresy and fungus- and mite-parasitism in Icosta have been little explored, and only in very few cases have the organisms involved been identified. A summary of all cases known to date is given in Tables 5–7. Of the 21 cases of phoresy, 9 species of birds (in 8 families, 4 orders) and 9 species of Icosta were involved. Each such fly usually carried a single louse. In an exceptional case, as many as 31 nymphs were found on 1 fly. Birds carrying phoresy flies were not necessarily their breeding hosts. In 2 cases, the lice were Ardeicola botauri Osborn. Of the 23 cases of fungus infection, 7 species of birds (in 6 families, 5 orders) and 8 species of Icosta were involved. None of such fungi was identified. Of the 117 cases of mite infestation, 42 species of birds (in 17 families, 10 orders) and 27 species of Icosta and Phthona were involved. Three species of the mites were identified, viz., Myialges (Myialges) caulo tooon Speis. on Icosta a. ardeae ex Pyrrherodia purpurea in Tanganyika; M. (M.) anchora Trouessart and M. (Promyialges) lophortyx Furman & Tarshis, both on I. hirsuta ex Lophortyx californica in California. It is thus evident that the same individual flies may harbor more than one species of mites. For details of the mites see the monograph by Fain. (1965).
Table 5. Mallophagan phoresy in Icosta species.

<table>
<thead>
<tr>
<th>Bird</th>
<th>Country</th>
<th>Fly</th>
<th>No. of lice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ardeidae (Ciconiiformes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Botaurus stellaris</em></td>
<td>Italy</td>
<td><em>I. a. ardeae, 1♀</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Cosmerodius albus</em> (see Beq. 1953a: 172)</td>
<td></td>
<td><em>I. americana, 1 fly</em></td>
<td>31</td>
</tr>
<tr>
<td>Accipitridae (Falconiformes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Circus cinereus</em> (see Beq. 1957: 577)</td>
<td></td>
<td><em>I. angustifrons, 1 ♀</em></td>
<td>1</td>
</tr>
<tr>
<td>Capitonidae (Piciformes)</td>
<td></td>
<td><em>I. trita, 2♂♂, 2♀♀</em></td>
<td>1 each</td>
</tr>
<tr>
<td><em>Megalaima oortii, TMT 1152, 1296, 1583, 1736</em></td>
<td></td>
<td><em>I. fenestella, 1 ♀</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Dierurinae</em> (Passeriformes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Phalacrocoracidae</em> (Pelecaniformes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Anhinga rufa</em> (see Beq. 1953a: 140)</td>
<td>Uganda</td>
<td><em>I. schoutedeni, 2♀♀</em></td>
<td></td>
</tr>
<tr>
<td><em>Psittacidae</em> (Psittaciformes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cacatua galerita, BBM 21560</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Bucerotidae</em> (Coraciiformes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Anorrhinus galeritus, RE 7128</em></td>
<td></td>
<td><em>I. bucerotina, 1 ♀</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Berenicornis cornutus, WS 189</em></td>
<td></td>
<td><em>I. holoptera, 1 ♀</em></td>
<td>1</td>
</tr>
<tr>
<td><em>Bucerotid indet., WS 787</em></td>
<td></td>
<td><em>I. albibrunnea, 2♀♀</em></td>
<td>2 each</td>
</tr>
<tr>
<td><em>Capitonidae</em> (Piciformes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Megalaima asiatica</em> (see Beq., i.e., as <em>I. fenestrella</em>)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Formicariidae</em> (Passeriformes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Thamnophilus unicolor</em> (see Beq. 1957: 578)</td>
<td></td>
<td><em>I. holoptera, 2♀♀, 9♀♀</em></td>
<td></td>
</tr>
<tr>
<td><em>Corvidae</em> (Passeriformes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Dendrocitta formosae, TMT 1612, 1974</em></td>
<td></td>
<td><em>I. fenestrella, 1 ♀, 1 ♀</em></td>
<td></td>
</tr>
<tr>
<td>Bird undet. (see Beq. 1953a: 141)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cormorant or egret nest material</td>
<td></td>
<td></td>
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</tbody>
</table>

Table 6. Fungus infection in Icosta species.

<table>
<thead>
<tr>
<th>Bird</th>
<th>Country</th>
<th>Fly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phalacrocoracidae (Pelecaniformes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Anhinga rufa</em> (see Beq. 1953a: 140)</td>
<td>Uganda</td>
<td><em>I. schoutedeni, 2♀♀</em></td>
</tr>
<tr>
<td>Psittacidae (Psittaciformes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cacatua galerita, BBM 21560</em></td>
<td>NW New Guinea</td>
<td><em>I. parallelifrons, 1 ♀</em></td>
</tr>
<tr>
<td>Bucerotidae (Coraciiformes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Anorrhinus galeritus, RE 7128</em></td>
<td>Thailand</td>
<td><em>I. bucerotina, 1 ♀</em></td>
</tr>
<tr>
<td>Berenicornis cornutus, WS 189</td>
<td></td>
<td><em>I. holoptera, 1 ♀</em></td>
</tr>
<tr>
<td>Bucerotid indet., WS 787</td>
<td></td>
<td><em>I. albibrunnea, 2♀♀</em></td>
</tr>
<tr>
<td>Capitonidae (Piciformes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Megalaima asiatica</em> (see Beq., i.e., as for <em>I. chalcocampra</em>)</td>
<td>Burma</td>
<td><em>I. trita, 1 ♀, 1 ♀</em></td>
</tr>
<tr>
<td>Formicariidae (Passeriformes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Thamnophilus unicolor</em> (see Beq. 1957: 578)</td>
<td>Colombia</td>
<td><em>I. holoptera, 2♀♀, 9♀♀</em></td>
</tr>
<tr>
<td>Corvidae (Passeriformes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Dendrocitta formosae, TMT 1612, 1974</em></td>
<td>Taiwan</td>
<td><em>I. fenestrella, 1 ♀, 1 ♀</em></td>
</tr>
<tr>
<td>Bird undet. (see Beq. 1953a: 141)</td>
<td>Celebes</td>
<td><em>I. simplex, 1 ♀</em></td>
</tr>
<tr>
<td>Cormorant or egret nest material</td>
<td>Uganda</td>
<td><em>I. meccornhina, 1 ♀</em></td>
</tr>
</tbody>
</table>

1) *Ardeicola botauri* Osborn, all immatures.
2) *Ardeicola botauri* Osborn.
Table 7. Mite infestation of *Icosta* and *Phthona* species.

<table>
<thead>
<tr>
<th>Bird</th>
<th>Country</th>
<th>Fly</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Ardeidae</em> (Ciconiiformes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Ardea cinerea</em></td>
<td>Madagascar</td>
<td><em>I. a. ardeae</em>, 1♀</td>
</tr>
<tr>
<td>&quot; goliath</td>
<td>Congo</td>
<td>&quot;</td>
</tr>
<tr>
<td><em>Pyrrophoridura purpurea</em></td>
<td>Yemen</td>
<td>1♀</td>
</tr>
<tr>
<td>&quot;</td>
<td>Tanganyika</td>
<td>2♀</td>
</tr>
<tr>
<td><em>Botaurus lentiginosus</em> (see Beq. 1953a: 156, as for <em>I. albipennis</em>)</td>
<td>Michigan</td>
<td><em>I. a. botaurinorum</em>, 1♀</td>
</tr>
<tr>
<td>&quot;</td>
<td>Minnesota</td>
<td>&quot;</td>
</tr>
<tr>
<td>&quot;</td>
<td>Pennsylvania</td>
<td>1♀</td>
</tr>
<tr>
<td>&quot;</td>
<td>Wisconsin</td>
<td>2♀</td>
</tr>
<tr>
<td>&quot;</td>
<td>Nebraska</td>
<td>&quot;</td>
</tr>
<tr>
<td><em>Bubulcus ibis</em></td>
<td>Illinois</td>
<td>1♀</td>
</tr>
<tr>
<td><em>Florida caerulea</em> (see Beq. 1955: 340)</td>
<td>Congo</td>
<td>1♀</td>
</tr>
<tr>
<td><em>Nycticorax nycticorax</em></td>
<td>Italy</td>
<td><em>I. a. ardeae</em>, 1♀</td>
</tr>
<tr>
<td><em>Accipitridae</em> (Falconiformes)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Accipiter bicolor</em> (see Beq. 1953a: 157)</td>
<td>Brazil</td>
<td><em>I. nigra</em>, 1♀</td>
</tr>
<tr>
<td>&quot; novaehollandiae, BBM 23840</td>
<td>Solomon Is.</td>
<td><em>I. chalcotayra</em>, 2♀</td>
</tr>
<tr>
<td>&quot; striatus (see Beq. 1953a: 157)</td>
<td>Ontario</td>
<td><em>I. angustiilestris</em>, 1♀</td>
</tr>
<tr>
<td><em>Buteo galapagaeensis</em> (see Beq. 1955: 322)</td>
<td>Galapagos</td>
<td><em>I. nigra</em>, 1♀</td>
</tr>
<tr>
<td>&quot; jamaicensis (see Beq. 1955: 322)</td>
<td>Arizona</td>
<td>&quot;</td>
</tr>
<tr>
<td>&quot;</td>
<td>Brit. Columbia</td>
<td>3♀</td>
</tr>
<tr>
<td>&quot; magnirostris* (see Beq. 1957: 577, as for <em>I. wolecott</em>)</td>
<td>Brazil</td>
<td><em>I. rufiventris</em>, 2♀</td>
</tr>
<tr>
<td><em>Hypomorphus urubitinga</em> (see Beq. 1957: 577)</td>
<td>Brit. Honduras</td>
<td><em>I. angustiilestris</em>, 1♀</td>
</tr>
<tr>
<td><em>Falconidae</em> (Falconiformes)</td>
<td></td>
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</tr>
<tr>
<td><em>Microhierax erythrogenys</em>, SU-BBM 1250, 1326, SU-PI 4204</td>
<td>Philippines</td>
<td><em>Ph. nigra</em>, 3♀, 4♀</td>
</tr>
<tr>
<td>&quot; melanoleucus</td>
<td>Tonkin</td>
<td><em>Ph. leptoptera</em>, 1♀</td>
</tr>
<tr>
<td><em>Milvago chimachima</em> (see Beq. 1953a: 157)</td>
<td>Brazil</td>
<td><em>I. nigra</em>, 1♀</td>
</tr>
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<td><em>Cathartidae</em> (Falconiformes)</td>
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<tr>
<td><em>Cathartes aura</em> (see Beq. 1955: 322)</td>
<td>Arizona</td>
<td><em>I. nigra</em>, 1♀</td>
</tr>
<tr>
<td><em>Phasianidae</em> (Galliformes)</td>
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<td></td>
</tr>
<tr>
<td><em>Gallus gallus</em>, RE 6234-35, WS 830</td>
<td>Thailand</td>
<td><em>I. maquilingensis</em>, 1♀, 1♀</td>
</tr>
<tr>
<td>&quot;</td>
<td>Burma</td>
<td>&quot;</td>
</tr>
<tr>
<td><em>Guttera edouardi</em></td>
<td>Uganda</td>
<td><em>I. zumpti</em>, 1♀</td>
</tr>
<tr>
<td><em>Hieronoswinhaxei</em>, TMT 1808, 1832</td>
<td>Taiwan</td>
<td><em>I. maquilingensis</em>, 1♀, 2♀</td>
</tr>
<tr>
<td><em>Lophotyax californica</em> (see Beq. 1953a: 158)</td>
<td>California</td>
<td><em>I. hirsuta</em>, 1♀, 3♀</td>
</tr>
<tr>
<td>&quot;</td>
<td>Queensland</td>
<td><em>I. australica</em>, 1♀</td>
</tr>
<tr>
<td><em>Rallidae</em> (Gruiformes)</td>
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<tr>
<td><em>Amaurornis phoenicurus</em>, M 1689</td>
<td>Malaya</td>
<td><em>I. holoptera omnisetosa</em>, 1♀</td>
</tr>
</tbody>
</table>
Table 7 (cont’d)

<table>
<thead>
<tr>
<th>Order</th>
<th>Family</th>
<th>Species</th>
<th>Host</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columbidae (Columbiformes)</td>
<td></td>
<td></td>
<td>SE New Guinea</td>
<td>I. simplex, 1♀</td>
</tr>
<tr>
<td></td>
<td>Ducula pinon, BBM 2976</td>
<td></td>
<td>Taiwan</td>
<td>I. chalcodemophaea, 1♀</td>
</tr>
<tr>
<td></td>
<td>“Wild pigeon”, Kungdien</td>
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<td></td>
</tr>
<tr>
<td>Cuculidae (Cuculiformes)</td>
<td></td>
<td></td>
<td>Burmese</td>
<td>I. sensilis, 1♀</td>
</tr>
<tr>
<td></td>
<td>Centropus sinensis</td>
<td></td>
<td>Philippines</td>
<td>2♀</td>
</tr>
<tr>
<td></td>
<td>toulou</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Phaenicophaeus curvirostris, BBM 761</td>
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</tr>
<tr>
<td>Strigidae (Strigiformes)</td>
<td></td>
<td></td>
<td>California</td>
<td>I. americana, 11 flies</td>
</tr>
<tr>
<td></td>
<td>Bubo virginianus</td>
<td>(see Beq. 1953a: 157 as for I. fusca)</td>
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Appendix I. HOST INDEX

Under each bird-family, non-breeding species of flies are in roman, breeding species are in italics. Generic names of birds are also in italics. Numerals in parentheses refer to approximate numbers of described species in respective bird-families.

TINAMIDAE (33): holoptera, plaumanni.

PELECANIDAE (6): albilennis, schoutedeni. 
Pelecanus: albilennis, schoutedeni.

ARDEIDAE (59): albilennis, americana, ardeae, botaurinorum, maquillingensis, sp. “F” nr schoutedeni. 

CICONIIDAE (17): albilennis, ardeae, sp. “S” nr ardeae. 

THRESKIORNITHIDAE (28): albilennis, massonnati. 

ANATIDAE (145): albilennis. 
Anas: albilennis.

ACCIPITRIDAE (205): albilennis (or botaurinorum ?), americana, angustifrons, ardeae, bucerotina, chalcolampra, dukei, fenestella, longipalpis, mecorrhina, meda, nigra, rufiventris, suvaensis, zumpti. 

FALCONIDAE (58): albilennis, americana, angustifrons, chalcolampra, leptoptera, modesta, nigra, nigrita, rufiventris, zumpti. 

PANDIONIDAE (1): americana, botaurinorum.
Pandion: americana, botaurinorum.

Cathartidae (6): angustifrons, nigra.

MEGAPODIIDAE (10): australica, simplex.


CRACIDAE (38): plauamini.

MELEAGRIDAE (2): americana.

EURYPYGIDAE (1): albipennis.

RALLIDAE (132): albipennis (or botaurinorum ?), ardeae, holoptera, maquilingensis, omnisetosa.

JACANIDAE (7): ardeae.


LARIDAE (89): albipennis, americana.

ALCIDAE (22): americana.

COLUMBIDAE (289): americana, chalcolampra, dioxyrhina, fenestella, plana, simplex.

PSITTACIDAE (316): angustifrons, chalcolampra, fenestella, maquilingensis, papulata, parallelifrons, paramonovi, plana, suvaensis, tuberculata, wenzeli.


MUSOPHAGIDAE (19): dukei, subdentata, mecorrhina, zumpti.


CUCULIDAE (128): chalcolampra, elbeli, latifacies, maquilingensis, minor, nigra, recessa, sensilis, simplex, wenzeli.


STRIGIDAE (134): albinpennis, americana, angustifrons, chalcolampra, fenestella, longipalpis, nigra, rufiventris, zumpti.


CAPRIMULGIDAE (67): ardeae, mecorrhina.


APODIDAE (79): zumpti.

Apus: zumpti.

TROGONIDAE (35): angustifrons.

Trogon: angustifrons.

CORACIIDAE (17): bicorna.

Eurystomus: bicorna.

ALCEDINIDAE (87): jactatrix, chalcolampra.


MEROPIDAE (25): minor.

Melitophagus: minor.

MOMOTIDAE (8): angustifrons.

Baryphthengus, Momotus: angustifrons.

BUCEROTIDAE (45): ardeae, bicorna, bucerotina, coalescens, dioxyrhina, maquilingensis, mecorrhina, nigrita, spinosa, wenzeli.

PICIDAE (210): americana, angustifrons, fenestella.

RAMPHASTIDAE (37): angustifrons.
Pteroglossus, Ramphastos: angustifrons.

CAPITONIDAE (76): maquilingensis, trita.
Megalaima: maquilingensis, trita.

EURYLAIMIDAE (14): chalcolampra.
Corydon: chalcolampra.

IRENIDAE (14): fenestella.
Irena: fenestella.

NECTARINIIDAE (104): (?) minor.
Cyanomitra: (?) minor.

FORMICARIIDAE (221): holoptera, plaumanni.
Chamaeza: plaumanni. Thamnophilus: holoptera.

PITTIDAE (23): fenestella, plana.
Pitta: fenestella, plana.

COTINGIDAE (90): angustifrons.
Pyroderus: angustifrons.

HIRUNDINIDAE (75): sensilis.
Hirundo: sensilis.

PYCNONOTIDAE (109): sensilis, trita.

CAMPEPHAGIDAE (72): chalcolampra, diluta, fenestella.

MUSCICAPIDAE (1460): angustifrons, fenestella, hirsuta, minor, plana, samoana, sensilis, tarsata.

MOTACILLIDAE (48): minor, sensilis.

LANIIDAE (67): minor, omnisetosa, sensilis.

MELIPHAGIDAE (160): chalcolampra.
Meliphagid indet. ("honeycater"): chalcolampra.

THRAUPIDAE (474): albipennis (or botaurinorum ?)
Piranga: albipennis (or botaurinorum ?)

FRINGILLIDAE (293): americana, angustifrons, hirsuta.

PLOCEIDAE (263): bicorna, lonchurae, minor, sensilis.


Appendix II. ORIGINAL DESCRIPTION OF LYNCHIA WITH TRANSLATION AND ANNOTATIONS

Lynchia was originally published by Weyenbergh (1881) in An. Soc. Cient. Argentina 11 (5): 195-200 (reprint: 3-8). The journal and reprint in question are so rare and the interpretation is so important in nomenclature, that a reproduction of the description, along with Bequaert's (1955: 269-72) revised translation (omitting the passages on color pattern) seems worthwhile. Bequaert's (1926b: 266-71) first translation differs very little from the revised one. To his annotations (in parentheses) are added mine [in brackets]; the italics are mine.


"Este género debe ser colocado entre Ornithomyia y Olfersia; si bien las antenas son
botoniformes, son más alargadas que en Ornithomyia, y peludas, especialmente en su estrecho, y están implantadas muy abajo. Los dos ojos compuestos son muy esféricos y dejan entre sí una frente ancha, pero no existen ojos simples, a pesar de que se observa, en el lugar donde generalmente suelen encontrarse, un pequeño escudo triangular, oscuro y un poco elevado. Por esta particularidad, la falta de ocelli, este género se aleja de Ornithomyia y se acerca a Olfersia. Las uñuelas tridentadas de los tarsos lo aproximan, por el contrario, a aquel y lo alejan de éste, en el cual son bidentadas. Las alas se asemejan, en general, a las de las Ornithomyia y de las Olfersia, pero en estas son muy redondeadas en el estrecho y en Ornithomyia son igualmente bastante obtusas, al paso que en el género Lynchia son muy puntiagudas, a pesar de ser al mismo tiempo bastante largas."—This genus must be placed between Ornithomyia and Olfersia. Although the antennae are button-shaped, [botón, a bud, sprout, button; here botoniformes should be translated gemmiform or bud-like], they are longer than in Ornithomyia and hairy, especially at the tips, and are inserted very low down. The two compound eyes are very globular (bulging) and leave between them a wide frons (interocular face); but there are no simple eyes, instead of which the spot which usually bears them forms a small dusky somewhat raised plate (postvertex). This lack of ocelli removes the genus from Ornithomyia and brings it near Olfersia. The tridentate claws, on the other hand, place it near the former and farther from the latter. (The structure of the claws is the same in Ornithomyia, Olfersia and Lynchia.) The wings are on the whole similar to those of Ornithomyia and Olfersia but in the latter, they are much rounded off at apex and they are also quite obtuse in the former; while in Lynchia they are very pointed but at the same time very long.

"La cabeza es chata, disciforme, como en los otros géneros citados, é igualmente se asemeja á estos por la articulacion con el tórax y todo el aspecto general. Los órganos bucales son muy cortos y están completamente ocultos en la corta vaina que los contiene. La línea ó sutura transversal ondulosa que divide el tórax en dos es muy distinta en este género, pero la longitudinal, que en los otros géneros se asemeja á un surco, es muy elevada en Lynchia, de modo que forma mas bien, por el contrario, una elevacion lineal. En el ángulo esterno del protorax se vé un estigmato oval, con varios pelos duros en el borde anterior. El escudete es muy corto y ancho. El abdómen lleva fuertes espinas en las márgenes laterales de sus segmentos y largos pelos en el estrecho. Las patas son poco peludas, encontrándose solamente algunos pelos mas fuertes cerca de las uñuelas.—The head is flat, disk-shaped, as in the genera mentioned, which it also resembles in its articulation on the thorax and general appearance. The mouth-parts are very short and completely hidden within the short surrounding sheath (palpi). The line or transverse suture, dividing the thorax into two (transverse mesonotal suture), is very distinct; but the longitudinal line (median notal suture), which is furrow-like in the other genera, is much raised in Lynchia, even forming a narrow ridge. The outer angle of the thorax bears an ovate spiracle, with several stiff setae on the anterior margin. Scutellum very short and broad. Abdomen with strong spines on the side margins of the segments [in Icosta of the Americas, only single segment with strong side-spines] and long setae at apex. Legs sparsely hairy, with only a few stronger setae near the claws.

"Las nervaduras de las alas son bestante caracteristicas, presentando todavía algun parecido con las de las Ornithomyia, pero las diferencias son mas grandes que la semejanza. Tres nervaduras solamente se estienden desde la articulacion hasta el borde inferior
Igualmente, como lo observamos en Ornithomyia, el sistema de las nervaduras alares es de color oscuro en la parte situada hacia el borde anterior y la articulación, como si hubiese una sustancia espesa dentro de estos tubos, mientras que lo demás es delgado y transparente. Meigen lo expresa [sic!] muy bien en sus dibujos del género Ornithomyia (System. Beschr. d. Europ. Zweifl. Ins. T. VI, Tab. 64).—The venation is characteristic, though somewhat similar to that of Ornithomyia; but the differences outweigh the similarities. Only three veins runs from the articulations to the lower (hind) margin of the wing. As in Ornithomyia, the veins are dark colored in the area near the anterior margin and the articulation (base), as if the hollowed veins were filled with opaque matter; while elsewhere the veins are delicate and hyaline. [Meigen showed these very well in his figures of Ornithomyia (System. Beschr.…….)]

"En cuanto a esto, existe en Lynchia una particularidad que ha llamado mi atención, la cual consiste en que siempre la nervadura discoidal está interrumpida por una parte clara y transparente; esta parte se encuentra en la mencionada nervadura, á corta distancia de la división de la posterior común en dos: la discoidal y la verdadera posterior. A primera vista, se cree que la nervadura efectivamente está interrumpida en este punto, pero, fijándose bien, pronto se aprecia uno de que no es mas que una interrupción en la sustancia que llena el vaso y no en el vaso mismo. He creído primero ver una anomalía casual, mas ahora me parece que es una particularidad típica.—I noticed the following peculiarity of Lynchia in this connection: the discoidal vein (4th longitudinal) is always broken by a clear and transparent stretch, a short distance beyond the fork of the common posterior (stem vein) into the discoidal and the true posterior (5th longitudinal). At first the vein seems actually interrupted there, but correct focusing proves that the break is not in the vein itself but in the substance filling the vein. I supposed originally that this was an accidental abnormality but I now regard it as a constant feature.

"La nervadura costal es muy corta, pues no se estiende mas de una tercera parte del largo del ala, punto en donde la subcostal se une á ella y forma entonces casi otra tercera parte de márgen anterior, estendiéndose hasta el punto donde la radial se une con la subcostal. La mediastina casi toca la subcostal, y el espacio entre ambas es por consiguiente muy angosto. No falta tampoco la transverso-basal, pero está colocada oblicuamente hacia afuera, entre la costal y la subcostal, antes del punto en que esta da origen á la mediastina.—The costal vein (1st and 2nd sections of costa) [1st section only] is very short, not extending beyond one-third of the wing, where the subcostal (1st longitudinal) unites with it and then forms one-third more of the anterior margin, to the junction of the radial (2nd longitudinal) and subcostal. The mediastinal (subcosta) almost touches the subcostal (1st longitudinal), the space between them being very narrow. The transverso-basal (humeral cross-vein) is present, but is outwardly slanted between the costal and subcostal basal of the origin of the mediastinal from the subcostal. [In Stilbome-topa or true Lynchia, but not in Icosta, vein C has a small bulla lying immediately before the junction of C and Sc. The presence of this bulla most probably led Weyenbergh to consider (a) the 1st section of C as if representing the entire length of his costal vein, (b) the section of C between its junctions with R₁ and with R₂₋₃ as if forming the apical continuation of his "subcostal" vein, and similarly (c) the section of C between its junctions with R₂₋₃ and with R₄₋₅ as if forming the apical continuation of his radial vein (see fig. 178)].
“La primera longitudinal se bifurca en radial y cubital muy cerca de su origen; la radial se dirige hacia el borde anterior, por donde sigue aún un poco, como si fuese la continuación de la subcostal y no tarda en unirse, bajo un ángulo agudo, con la cubital, es decir, en el mismo borde; esta reunión se efectúa poco más o menos a los dos tercios de la longitud de dicho borde. Todo lo demás de la margen del ala está desprovisto de nervaduras.—The first longitudinal (base of 2nd and 3rd longitudinals) bifurcates into the radial (2nd longitudinal) and the cubital (3rd longitudinal) very close to its own origin. The radial runs toward the anterior margin where it continues for some distance as the continuation of the subcostal (1st longitudinal) and soon unites at a sharp angle with the cubital, also in the anterior margin; the junction lies at about two-thirds [in larger species of American Icosta, beyond 2/3] of the length of the anterior margin. Along the remainder of the margin there is no vein.

“La segunda longitudinal o posterior común se bifurca casi inmediatamente después de su origen, y el resultado de esta bifurcación es la discoidal y la verdadera posterior; la primera se dirige primeramente un poco hacia el borde posterior y después, formando un ángulo, hacia el anterior, de lo cual resulta, que la primera célula articular (que se encuentra entre la nervadura cubital y la discoidal y que es cerrada por la transverso-media) es bastante angular en su parte esterna. Después de haberse unido con la cubital, hacia poco más o menos dos tercios del largo de ésta, por intermedio del mencionado transverso-medio, la discoidal se dirige, suavemente encorvada, al borde inferior del ala, donde termina hacia el cuarto próximo de la longitud del dicho borde. La otra rama, la verdadera posterior, se dirige, también con una suave curvatura, al mismo borde, en cuyo medio, poco más o menos, termina. El nervulo transverso-discoidal la une con la nervadura discoidal en el punto donde ésta forma el mencionado ángulo, resultando así la formación de la célula discoidal. No existen nervulos transverso-posteriores.—The second longitudinal or common posterior (stem-vein of 4th and 5th longitudinals) bifurcates almost at once beyond its origin, forming the discoidal (4th longitudinal) and the true posterior (5th longitudinal). The discoidal runs at first somewhat toward hind margin, then bends [in Icosta, this bend is not, or hardly, noticeable] toward the anterior margin, so that the first articular cell (1st basal cell), between the cubital (3rd longitudinal) and discoidal and closed by the transverso-media (anterior cross-vein), is very angular outwardly. The discoidal is connected with the cubital by the transverso-media at about two-thirds [in larger American species of Icosta, distinctly beyond 2/3] of the length of the cubital, beyond which the discoidal gradually curves toward hind margin of wing, where it ends at about apical fourth. The other branch or true posterior (5th longitudinal) also curves gently toward the same margin where it ends at about mid-length. The transverso-discoidal (anterior basal cross-vein) reaches the discoidal at the above-mentioned bend of this vein, to form the discoidal cell (2nd basal cell). There are no transverso-posterior veins (anal and discoidal cross-veins) [sic ! see annotation(e)].

“La nervadura anal nace con raíz doble, se dirige, con fuerte curvatura, al borde posterior del ala y termina hacia los tres cuartos de la longitud de éste (contando desde la punta del ala).—The anal vein (6th longitudinal) [in Icosta, that is the 7th longitudinal] has a double origin, is strongly curved toward the hind margin and stops at about three-quarters of the margin, as measured from the tip of the wing.

“Todo el conjunto de nervaduras que forma lo que llamamos el sistema anterior se en-
cuenta muy cerca del borde anterior del ala, y lo mismo se puede decir también de la nervadura discoidal, de lo cual resulta que las células 6 espacios internerviales son muy largas y angostas; solamente las tres células posteriores y las axilares son grandes y anchas. —The several veins of what I call the anterior system are crowded near the anterior margin, the cells and spaces between the veins being very long and narrow. Only the three posterior [cells] and the axillary cells are large and wide. [In what is here called Icosta, there is only single axillary cell which was labeled by Bequaert in 1926b: 268 as 2d A; in Weyenbergh's Lynchia, there are 2 such cells, one before and another behind vein 2A, both cells lying behind the 3 posterior cells which are here labeled as Ir, Im and 2m. Note the word “las”, not “la” in the original text].

“Esta colocación de dicho sistema cerca de la margen anterior del ala se observa también en las Ornithomyia, pero no tan pronunciada como en el género Lynchia, y por consiguiente las células aludidas no son en Ornithomyia tan alargadas y angostas como en Lynchia. Otra diferencia con Ornithomyia es la falta de la nervadura mediastina en este género, la cual forma una sola con la subcostal. La transverso-basal es más perpendicular en Ornithomyia. Parece que en este género nace una nervadura incompleta en el punto donde la cubital termina en la margen anterior y se dirige, con fuerte curvatura, á la punta del ala, cortando una parte de la primera célula posterior, pero incompletely, porque, como acabo de decir, esta nervadura rudimentaria no llega al borde mismo. También parece que en Ornithomyia, la margen anterior está orillada por una nervadura que se extiende hasta corta distancia de la punta, lo cual no se vé en Lynchia.—The crowding of veins near the anterior margin is also seen in Ornithomyia but not so marked as in Lynchia, so that the cells between them are not so long and narrow. Ornithomyia also differs in lacking a mediastinal (subcosta) which is fused with the subcostal (1st longitudinal). (This is erroneous. The subcosta or mediastinal is present in Ornithomyia as well as in Lynchia and most other genera of Hippoboscidae). The transverso-basal (humeral cross-vein) is more perpendicular in Ornithomyia. It appears that in that genus an incomplete vein starts from the point where the cubital (3rd longitudinal) ends in the anterior margin, and forms a strong curve toward the tip of the wing, cutting off part of the first posterior cell [cell 3r], but incompletely since this rudiment of vein does not reach the margin itself. It also seems that in Ornithomyia the anterior margin is bordered by a vein to within a short distance of the tip, a feature not seen in Lynchia. (No specimen of Ornithomyia or any other hippoboscid I have seen shows the incomplete vein curving off from the tip of the 3rd longitudinal, or the extension of the costal vein to near the tip of the wing as described by Weyenbergh. This author was misled by Meigen's defective figure of the wing of Ornithomyia. In Ornithomyia the apex of the 1st posterior cell bears microtrichia on both sides of the membrane and this area is sometimes set off by a curved crease simulating a spurious vein.)

“Además, en Ornithomyia existe el primer nérnulo transverso-posterior, el cual se observa casi al nivel del transverso-discoidal, cuya continuación parece ser, formando con él una figura algo semejante á S, y es especialmente esta circunstancia la que establece una diferencia importante en esta parte del ala, cuando se comparan los dos géneros entre sí. También parece existir en Ornithomyia un segundo nérnulo transverso-posterior, situado muy cerca de la articulacion, entre las nervaduras anal y posterior, inmediatamente detrás de la bifurcacion del posterior común en discoidal y verdadero posterior. Como mas arriba deje dicho, en Lynchia no existen absolutamente estos nérnulos.—In
addition, Ornithomyia has a first transverso-posterior vein [vein im] placed about opposite the transverso-discoidal (anterior basal cross-vein) [recte: not a cross-vein, but the short section of M_{1+2} between rm and im] which it appears to extend forming with it an S-shaped figure; this feature especially produces an important difference in that part of the wing when comparing the two genera. (Weyenbergh used for comparison a drawing of the wing of Ornithomyia by Meigen (1830, 6, pl. 64) which explains some of his erroneous interpretations. He failed to note that the first transverso-posterior vein which he described in Ornithomyia corresponds [sic!] to what he called the transverso-discoidal in Lynchia, the second basal cell being so long in Ornithomyia that the anterior cross-vein and the anterior basal cross-vein are close together; in Lynchia these two cross-veins are far apart). In Ornithomyia there seems to be a second transverso-posterior vein (anal cross-vein) very near the articulation (basally), connecting the anal (6th longitudinal) and the posterior (5th longitudinal) immediately beyond the forking of common posterior (stem-vein) into the discoidal (4th longitudinal) and true posterior (5th longitudinal). As I mentioned, this cross-vein is entirely lacking in Lynchia.


"Los tarsos son como en toda la familia y los halteres ó balancines se asemejan á los del género Ornithomyia.—Tarsi as usual in the family; halteres as in Ornithomyia.

"Lynchia Penélopides n. sp. L. sepia-obscura, oculis subfuscis margine orbitali piceo. Antennae flavescentes extremo obscuro. Frons flavescens. Femora anteriores aurata ... Estos ojos son grandes y esféricos y presentan las facetas como si fuesen puntos ... encima del occipucio se vó un escudo triangular oscuro y un poco elevado ... escudo torácico, el cual lleva pelos en su borde posterior ... Los fémures son chatos ... El vientre es finalmente granulado ó chagrinado, lo cual se vó especialmente, con mucha claridad, en la hembra. La interrupción de la nervadura discoidal cerca de su origen, que ya he mencionado en la descripción del género, no es quizás sinó un caracter espec- cifico; por lo demás, esta particularidad me parece ser constante. La mayor estension de las alas es, medidas desde la punta de la una hasta la de la otra, 2.5 centim.; la longitud del animal (incluyendo la cabeza, pero no las alas) es, en la hembra, da 1 centim. y en el macho de 8 milim. Esta especie vive parasita entre las plumas del ave que aquí llaman Pavo del Monte, Yacú ó Charata, y que en la ciencia lleva el nombre de Penelope canicollis Wagl. El ave y su parasito no son raros en la provincia de Tucuman, según el Señor D. F. Schulz.—The eyes are large and spherical ("esféricos" meaning bulging or convex), with punctiform facets ... the top of occiput bears a triangular dusky somewhat raised plate (postvertex) ... scutellum, the latter bearing hairs at the hind border ... Femora flat...Venter finely granulate or shagreened, particularly in the female. The break in the discoidal vein (4th longitudinal) mentioned in the generic description, is possibly a specific character only; but it seems to be constant. Spread of wings, from one wing tip to the other, 2.5 cm. Length, including the head, but not the wing, 1 cm. in ♂, 8 mm in ♀.

Evidently Weyenbergh was handicapped by the lack of any appropriate specimens to
compare with his new genus and had difficulty in horismology. He relied heavily on Meigen's defective figures of *Ornithomya* (here enlarged and reproduced) and van der Wulp's somewhat confusing venational terminology which resulted in several serious discrepancies. These have been partly pointed out by Bequaert and are explained below (venational notations mine).

(a) “The tridentate claws place Lynchia farther from Olfersia.” Weyenbergh might have been misled by Schiner's (1864 Fn. Austr. 2: 645) description of *Olfersia* “Beine in der Hauptsache wie bei Hippobosca” for which the claws were described as “unten mit je einer zweiten stumpfen Afterklaue.”

(b) “The wings in Olfersia are much rounded off at apex.” Perhaps Weyenbergh got such an impression by comparing Leach's (1817a) figures of *Feronia spinifera* and *F. americana* and Macquart's (1835, 1847a, 1847b) figures of *Olfersia ardeae, O. bisulcata* and *O. rufipes*.

(c) “The wings in *Ornithomya* are quite obtuse at apex, etc.” This was evidently based on Macquart's figure which also misled Weyenbergh in describing *Ornithomya* as if without an Sc, with a curved incomplete vein below the apex of R4+5, and apex of R4+5 to be within a short distance of wing tip.

(d) “The radial [R2+3] in Lynchia runs as the continuation of subcostal [R1].” Weyenbergh termed the penultimate and ultimate sections of C as a part of R1 and R2+3 respectively (see fig. 178). Probably the existence of a transparent interruption of C near the true apex of R1 in his *Lynchia* (but not *Icosta*) gave him a wrong impression that the C did terminate at that interruption.

(e) “There are no transverso-posterior veins in Lynchia.” This statement misled Speiser and others in interpreting *Lynchia* as what are now called *Pseudolynchia* and *Microlychnia* which have no im and mcu. Bequaert simply annotated these veins as im and mcu but did not give any comments or explanations as to why Weyenbergh's description would fit the genus here called *Icosta*, which clearly has an im. My explanations are that, first, the transverso-posteriors in Weyenbergh's sense were the cross-veins lying behind what he termed or considered transverso-discoidal (see next entry), and second, Weyenbergh considered the Cu+1A (anal) of his *Lynchia* to have a double origin, hence the real mcu was assumed by him to be not a transverso-posterior but one of the origins of Cu+1A (see below).

(f) “In addition, Ornithomyia has first and second transverso-posterior veins.” Bequaert annotated the 2nd transverso-posterior as mcu but did not annotate nor give any comments on the 1st one. I was at first (1963: 106-09, Table 3) unable to interpret this bewildering term, and now probably find the explanation. Weyenbergh's wording “in addition (además)” should be interpreted as “in addition to the above-mentioned veins including transverso-discoidal”. His transverso-discoidal in *Ornithomyia* should instead be the short section of M1-2 lying between rm and im. If this was not the case, the cross-veins rm and im in *Ornithomyia* (particularly in Meigen's figure) would jointly form a W-, not S-shaped figure! Following this precondition, Weyenbergh, therefore, termed the im and mcu as the 1st and 2nd transverso-posteriors, respectively.

(g) “The anal vein has a double origin.” The seemingly double-origined Cu+1A in Weyenbergh's *Lynchia* is a character unknown in any other hippoboscid genera and quite obviously is the basis of his mis-statement that there were no “transverso-posterior veins”
which in turn led to Bequaert's mis-interpretation of that generic name. Bequaert did not give any comments regarding the meaning of "raiz doble". A discussion on this character was provided by me (1963: 105, fig. 3-4) and is not repeated here.

In addition, several negative characters in Weyenbergh's description should be examined. It is surprising that while stressing the distinctiveness of the bulla (transparent interruption) on vein $M_{1+2}$, he failed to mention the bullae on $C$ and $im$, and the setulae (microtrichia) on wing-membrane. Their possible explanations seem to be that the bulla on $C$ might have been considered by him the demarcation of his costal and mediastinal or "first longitudinal" veins, that the bulla on $im$ might have been considered too variable and too indistinctive (this is particularly true in dry specimens; in what I call Icosa, the bulla is much longer and more conspicuous) and that there are no such setulae in his genus, although fairly conspicuous in Icosa. Furthermore, while describing the granuloseness of abdominal venter, Weyenbergh did not mention the transverse striation of abdominal dorsum which is not to be found in his Lynchia but is very conspicuous in Icosa.

The non-conformities of Weyenbergh's description against what is here called Icosa have been discussed at length by me (1963: 104-11). A few additional points since then were disclosed and are incorporated in the following list and accompanying figures (fig. 172-178): Antennae longer than in Ornithomya, eyes very bulging, mouthparts very short, palpi short, median notal suture much raised, anterior thoracic spiracles ovate, scutellum very short and broad and bearing bristles (pelos) on hind margin, wings very pointed and very long, first section of vein $C$ not more than $1/3$ as long as wing, vein $h$ present, junction of veins $C$ and $R_{4+5}$ lying about $2/3$ of length of anterior wing-margin, vein $rm$ joining $R_{4+5}$ at about $2/3$ of length of latter, vein $M_{1+2}$ with a bend at its junction with $im$, apical sections of veins $M_{1+2}$ and $M_{3+4}$ both gently curved, that of $Cu+1A$ more strongly so, vein $Cu+1A$ (seemingly) with a double origin, spaces and cells between branches of veins $R$ and $M$ very long and narrow, more than one "axillary cells", more than one abdominal segments with strong spines on their side margins, abdominal venter finely granulose.

One must be reminded that the non-conformities listed above do not necessarily apply to Icosa species occurring in the Old World, and that not all these points are of equal importance and significance. Also to be noted is the fact that Bequaert gave no comments on these non-conformities nor on some of Weyenbergh's discrepancies such as the true nature of the 4 cross-veins (transverso-media, transverso-discoidal, 1st and 2nd transverso-posteriors) and the double-originated anal vein. These omissions might be deliberate or by oversight. For comparison, Meigen's figures of Ornithomya are here enlarged and redrawn, (fig. 174, 178), along with figures of the 2 largest and commonest American species of Icosa as well as Stilbometopa ramphastinis Ferr. which is possibly synonymous with Weyenbergh's species. To avoid possible prejudice and subjectivity, figures of the latter species (fig. 172, 173, 175, 177) are redrawn from Ferris (1927a: fig. 2, 3, 1930c: fig. 1, 2).

Although Lynchia Weyenb. 1881 (not of Beq., etc.) is evidently synonymous with Stilbometopa Coq. 1899 and clearly has priority over the latter name, it seems best to conserve Stilbometopa instead. The names have been shifted about so much, and the interpretations of Weyenbergh's description have been so diverse, that the strict application
of the law of priority would merely cause endless confusion. A proposal to reject Lynchia Weyenbergh, is going to be submitted to the International Commission of Zoological Nomenclature.

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1879. Rondani, C. Boll. Soc. Ent. Ital, ll: 3–28. (Ornithophila n. g. for n. sp. vagans; Olfersia n. sp. botauri).


1897. van der Wulp, F. M. Termesz. Fuzetek 20: 136–44. (Olfersia n. sp. longirostris).


1905a. Speiser, P. Zs. Hym. Dipl. 5: 347–60. (Icosta n. g. for dioxyrhina; Olfersia n. spp. nigrita, trita).

1963. Maa, T. C. Genera and species of Hippoboscidae (Diptera). Pacific Ins. Monogr. 6: 1-186. (Synonymy and subgeneric classification of Lynchia spp. of the world; Weyenbergh’s description re-interpreted; 31 spp. listed as distinct; revision of L. meda and nigrita groups incl. n. spp. meda, modesta, leptoptera).


1967. Maa, T. C. Diptera: Hippoboscidae; Streblidae. Ins. Micronesia 14: 251-74. (Listed from Pacific islands, 26 Icosta species incl. nom. nuda which are fully described in this article).

ADDENDUM

Since the above paper went in press, fresh specimens of Icosta samoana and 3 apparently undescribed species came into my hands. They are added below.

Icosta (Icosta) samoana (Ferris)  Fig. 179.


The following descriptive notes are based on the above-listed specimen. Occipital margin straight; vertical bristle of normal length; postvertex 7.5×22, shorter than in Ferris' figure. Inner orbit slightly less narrowed forward than in Ferris' figure. Frons proper short; frontal notch rather wide, rounded; frontal process slightly shorter than palpus, in profile gently curved, subacute at apex. Vibrissal process in profile normal, triangular, slightly shorter than wide at base, fringed with dense pale setae, apex acute, with 1 black bristle on inner surface. Gula posteriorly with 1-2 spines at each side. Palpus (fig. 179) moderately long. Mesonotum 36×47; prescutum feebly densely striate all-over; 2 humeral and 2 mesopleural bristles; laterocentral setae not uniform in length, 3 or 4 of them at each side ca 4-6× as long as interdistance of their basal punctures. Scutellum 10×25, posterior margin evenly convex. Metapleurotergal callus bearing 4-5 strong curved spines in single series plus some irregularly arranged setae of varied length and robustness. Prosternum transversely linear, poorly sclerotized. Metasternal process less pronounced than in Ferris' figure. Wing as in fig. 140 but cell lm with small patch of setulae on basal corner, therefrom forming a narrow stripe which runs subparallel to vein M3+4 and apically merges into the extensive setulose area. Femur 1 strongly swollen, basal 1/2 of anterior surface with 2 rows of short setae near lower margin, otherwise bare. Tibia 3 similar to that in diluta as shown in fig. 11. Tarsal spines 2.1.1.0/2.1.1.0/2.2.1.1; tarsomeres 3-4 of foreleg hardly asymmetrical; tarsomere 1 of hindleg 9×4, as long as 2+3 and as 5; tarsomeres 2-4 of same leg distinctly asymmetrical. Abdomen of ♀ as figured by Ferris but setae on laterite 2 and lateral membrane longer, stronger; laterite 7 small, roundish, with 1 bristle plus 1-2 setae; urogenital area anteriorly fenced by row of fine short setae.

Icosta (Armeoeca) macclurei Maa, new species  Fig. 180-185.

Habitats. At present known only from Thailand, possibly widely distributed in the Orient, and perhaps the sp. "F" from Fukien, China referable here. Apparently breeding on Ciconiiformes: Ciconiidae (Anastomus).

Systematics. Related to schoutedeni from which it differs in: ♀ abdomen with a number of strong setae immediately before tergite 6, tergite 6 subtriangular, not trapezoid, bristle-tufts lying at level of spiracle 4 rather than 3; ♂ tergite 6 shorter and with fewer setae, aedeagus strongly curved more closely to base, postgenital plate longer. The body-size is relatively larger and palpus narrower. Runs to massonnati in the key on p. 139 which may be revised as follows.

5. Female abdominal dorsum with a number of strong setae arranged immediately before tergite 6 and with bristle-tufts lying at level of spiracles 4; ♂ tergite 6 (fig. 183) very short, postgenital plate (fig. 185) comparatively longer. Thailand macclurei

Female abdominal dorsum with at most very few short fine setae lined immediately before tergite 6; bristle-tufts, when present or definable, lying at level of spiral 3 (i.e., just at sides of tergite 3); ♂ tergite 6 longer, postgenital plate comparatively shorter (♂ of massonnati unknown).

5a. Female abdominal dorsum with pair of conspicuous tufts of dense strong bristles at sides of tergite 3 (i.e., at level of spiral 3), tergite 6 unusually large and long, trapezoid in outline; ♂ tergite 6 ca 4× as wide as long. W. and E. Africa.

regarding the illustration:

Fig. 180-182. Icosta (Armdoeca) macclurei Maa: 180, ♀ palpus; 181, ♀ abdomen, dorsal; 182, ♀ abdomen, ventral.
Female abdominal dorsum (so far as figured by Massonnat, 1909) lacking such bristle-tufts, tergite 6 not as above; ♂ unknown. France.......................... massonnati

6. S. African form; ♀ lacking pregenital plate, laterite 3 triangular in dorsal view; ♂ unknown
Non-African forms; ♀ with distinct pregenital plate (though often small), laterite 3 subquadrate in dorsal view; ♂ tergite 6 ca either 2 or 4 × as wide as long

Massonnati is impossible to be compared in detail since it is inadequately known and its type is apparently lost. But the above couplets should probably leave no or little difficulty in recognizing the new species. In shape of tergite 6, site of bristle-tufts and other features of ♀♀, macclurei is very closely similar to sp. “N” (known to me only from dry specimens) but the short laterocentral setae and subquadrate laterite 3 in that Australian species probably would not be mistaken for macclurei. The species is named in honor of Dr H. Elliott McClure of the Migratory Animal Pathological Survey in recognition of his cooperation during last 6 years and of the wonderful achievements of the Survey.

♀. Color very dark, wings weakly fuscous, anterior veins black. Head: Occipital margin straight; vertical bristle brown, distinctly paler than and ca as long as notopleural bristle; postvertex ca 1/3 as long as wide, evenly raised, anteromedially gently depressed, anterior margin virtually straight, and very close to median pit; mediovertex much more depressed than postvertex. Relative width of eye, inner orbit and mediovertex at level of widest part of head (in front view) 12 : 8 : 15. Face practically parallel-sided, its smallest width equal to eye-length; inner orbit raised, inner margin depressed, lined with 2 series of pale setae. Frons proper ca 1/2 as long as average width of frontal process, narrower than antennal base; frontal notch angular;

Fig. 183–184. Icosta (Ardmoeca) macclurei Maa: 183, ♂ abdomen, dorsal; 184, ♀ abdomen, ventral.
frontal process in dorsal aspect straight along inner margin, ca 4/5 as long as palpus. Palpus as in fig. 180. Gula posteriorly lined with single series of 10± pale setae or black spines or mixture of both. Thorax: Anterior spiracle dorsal, large, 2× as wide as long. Humeral callus anteriorly with rather short spines, posterior with, besides 1 humeral bristle, some pale setae. Mesonotum 76×99; prescutum finely striate all-over, anterior striae much denser than posterior ones; latero-central bristles ca as long as width of anterior spiracle, almost reaching transverse mesonotal suture. Scutellum 18×51, shorter than scutum, with evenly curved posterior margin. Mesopleural concavity with distinct upper and lower margins. Metapleurotergal callus with 3-5 long spines and some soft setae of similar length. Prosternum subtriangular, moderately sclerotized, with 15 ± long pale setae; anterior mesosternal lobe emarginate, base of its bristle equidistant to anterior and lateral margins; mesoscutum posteriorly with pair of small patches of pale setae. Wing 7.7-8.6 mm long; surface (incl. alula) entirely covered with setulae but setulose stripe of cell 2a hardly wider than vein 2A and not reaching apical margin of that cell; vein rm as thick as adjacent part of R 4+5, closer (53:72) to im than to apex of C, lying at or hardly apical to level of apex of R1; bulla of M 4+5 situated at a point of apical 1/3 of cell 2bc. Tarsal spines 2.1.1.0/2-3.1.1.0/7-9.2.1.1; tarsomere 1 of hindleg hardly longer than 2+3+4 and than 5, tarsomeres 2-4 distinctly asymmetrical, each shorter than wide. Abdomen (fig. 181-182) quite unevenly setose. Syntergite 1+2 produced posterolaterally, with pale setae, laterally mixed with some black erect setae. Tergite 3 small, laterally with some small setae. Dorsum of laterite 3 triangular, uniformly covered with short sparse setae. Dorsal striolate area largely bare, posteriorly with several rows of strong setae of varied length; area behind laterite 3 with

![Fig. 185. Icosta (Ardmoeca) macclurei Maa: ♂ aedeagus, paramere, and postgenital plate.](image-url)
roundish compact tuft of long strong bristles at level of spiracle 4, followed by patch of strong spines of varied length. Tergit 6 subtriangular, strongly protruding caudad, apex narrowly rounded, apical margin with strong bristles, dorsal surface with similar setae as on laterite 3, ventral surface membranous, bare. Laterite 2 sparsely setose; venter of laterite 3 also subtriangular, inner 1/2 bare. Setae of ventral membrane much varied in length and robustness and in size and pustulateness of basal papillae; discal setae long, fine, with small basal papillae, mostly pale, and followed by 4-5 rows of moderately strong setae with large basal papillae and then by large patch of exceedingly dense fine short setae, this patch forming anterior fence of urogenital area; setae on posterolateral area short, heavy, curved, their basal papillae large and strongly pustulate. Pregenital plate small, roundish or transversely elliptical.

♂. Similar. Laterocentral bristles reaching or almost reaching transverse mesonotal suture. Abdomen (fig. 183-184) similar to that of schoutedeni but laterite 3 comparatively narrower, tergit 6 shorter and with fewer setae. Genitalia as in fig. 185.

*Icosta (Icosta) malagasii* Maa, new species


**Habits.** Apparently confined to the Malagasy Subregion; the “Lynchia dioxyrhina” of Falcoz (1930, Encycl. Ent. B 5: 47) from the Grande Comore Is. probably referred to *malagasii*. Hosts unknown but by implying parallelism in host relationships with related species (*chalcolampra* Speis. and *meocorrhina* Maa), this Malagasy species is perhaps chiefly a parasite of Falconiformes.

**Systematics.** In spite of the geographical position of Madagascar, this new species shows strong Oriental, rather than Ethiopian affinities. It is the only Ethiopian member of the Plana subgroup and stands most closely to *chalcolampra*. From the latter species, *malagasii* can immediately be recognized by its narrower face, shorter palpi, less extensive wing-setulae, moderately swollen femora 1, broader tergit 3 and unusual feature of anterior fence of ♀ urogenital area. Among the known Ethiopian species of the subgenus, *meocorrhina* may be counted as its remote relative but the disparity is well marked. The quite long frontal processes, symmetrical tarsi 1, richly spinose basitarsi 3 and rather uniform abdominal setae in the former species can hardly be mistaken for the latter. Most significant features of abdominal chaetotaxy in *malagasii* are the strong contrast in size and prominence of setigerous papillae at dorsolateral area versus elsewhere, and the pair of setal patches fencing ♀ urogenital area. For the inclusion on *malagasii* the “14” at ending of the couplet 13 (p. 95) should be changed to “13a” and the “14 (13)” at the beginning of the next couplet, changed to “14 (13a)”, and a new couplet should be inserted in between:

13a (13). Tarsomeres 3 and 4 of foreleg virtually symmetrical at apices; ♀ abdomen with basal papillae of dorsolateral setae similar in size and prominence to those of setae on other membranous area; ♀ urogenital area lacking anterior fence as described below ................................................................. 14

Tarsomeres 3 and 4 of foreleg clearly asymmetrical, with posterior apical lobes markedly longer than corresponding anterior ones; ♀ urogenital area anteriorly fenced by pair of small setal patches. Madagascar ................................ *malagasii*

♀. *Color* fairly dark, wing very weakly infuscated. **Head** (fig. 186): Occipital margin almost
Fig. 186-190. *Icosta (Icosta) malagassii* Maa,♀. 186, head in front view; 187, thorax in dorsal view; 188, wing (pt.), semidiagrammatic, showing distribution of setulae on cells 1m and 2m+1a; 189, abdominal apex, dorsal view; 190, abdomen apex, ventral view. Drawn from holotype (in alcohol) by Miss Suzanne Keenan; basal papillae of setae in fig. 189 and 190 are actually larger in proportion than that shown here.

straight; vertical bristle 2/3 as long as notopleural bristle; postvertex short, anteriorly truncate, anterior 1/2 of median fovea distinct. Face slightly wider than eye, hardly narrowed anteriorly; posterior pair of orbital bristles poorly developed. Frons proper very short, anteriorly widely notched at middle; frontal process less than 1/2 as long as palpus, in profile gently decurved, apically subacute. Vibrissal process in profile normal, shorter than wide at base, apically blunt, dorsally separated from frontal process by pale submembranous stripe. Gula posteriorly with an incomplete series of spines. *Thorax* (fig. 187): Prescutum densely strongly striate all over, laterocentral setae all pale, very fine and far from reaching transverse mesonotal suture; scutellum normal, scutellar bristle finer than notopleural bristle; metapleurotergal callus with 4-5 spine-like setae and several minor ones. Prosternum ca 2.5 X as wide as long, well sclerotized; metasternal process poorly developed. Wing (fig. 188) 5.5 mm long; setulae about as extensive as in *samoana* Ferr. and *diluta* n. sp. and covering cell 3r as a whole and 1r, 2r, 1m and 2m+1a in part; 1r and 2r bare at extreme bases, 1m largely bare at basal 1/2, 2m+1a setulose only at apex and narrowly along part of anterior margin. Femur 1 moderately swollen, basal 1/2 of
anterior surface bare at upper part and evenly covered with short erect setae at lower part; anterior surface of femur 2 traversed at midlength by an arcuate series of 7-8 slender spines of varied length, basal part of surface with pale, very fine setae. Tibia 3 similar to that of chalcolampra. Tarsal spines 1.1.1.0/3.1.1.0/2.2.1.1.; posterior apical lobe of tarsomere 4 of foreleg much longer than corresponding anterior lobe, that of tarsomere 3 moderately so. Tarsomere 1 of hindleg 2/5 as wide as long, hardly shorter than 2+3+4, slightly longer than 5; tarsomeres 2-4 slightly asymmetrical at apices. Abdomen (fig. 189-190) with short, rather fine setae on dorsal striolate area and immediate vicinities; dorsolateral setae with much larger and more prominent basal papillae than setae on remaining membranous area; ventral setae uniform, longer and more robust than dorsal ones, those fencing urogenital area not noticeably longer or more robust but forming pair of small roundish patches. Tergite 3 fairly wide; tergite 6 posteriorly concavely curved, with 7-8 pairs of bristles. Laterite 3 moderately wide; laterite 7 entirely undefinable. ♀ unknown.

**Antica Group**

**Distribution.** 1 species; probably confined to the Papuan Subregion.

**Host Relationships.** Not clear; the only record was from Casuariiformes (Casuariidae), but that needs verification.

**Diagnosis.** No laterocentral setae or bristles; all setae on prescutum arranged closely along lateral margins of latter; prescutellar setae evenly strong, much stronger than orbital setae. Wing very ample, anterior longitudinal veins not quite closely approaching costa; cell 2bc exceptionally large and long, with bulla on its anterior margin (i. e., vein M<sub>1+2</sub>) much closer to base rather than apex or middle of the cell; 2a broad; vein 3A almost as strong as 2A. Tarsal claws so small that it is quite out of proportion to other parts of body, heel small and well apart from preapical tooth which is close to apical tooth.

**Affinities.** Insofar as the above mentioned diagnostic characters are concerned, this group appears to stand at the very beginning of Recent forms of Icosta-complex. The broad axillary lobe in combination with the strong vein 3A and the small heel of the tarsal claws strongly suggests the convergence of this group to the archaic genus Ornithophila. In the key to genera and subgenera of Icosta-complex (p. 34), the group runs to subgenus Ornithoponus largely because the vibrissal area is broadly rounded into frontal process and the legs are thinly setose. Relatively it is closer to the Americana than to any other groups and shares with the Americana group characters listed in Table 2 except for: mesopleural concavity fairly distinct, cell 2bc exceedingly long, 2m+1a and alula both uniformly setulose, ♀ tarsus 2 with peg-like spines, syntergite 1+2 with long posterolateral lobes.

**Icosta (Ornithoponus) antica** Maa, new species Fig. 191-197.

**Material.** NE NEW GUINEA: 2♂♀, Clear Water, base of Mt. Missim, Wau, Morobe Distr., ex cassowary (BBM 54411), 6 IX. 1967. Holotype (Bishop 7573) and paratype in Bishop Museum.

**Habitats.** New Guinea, submontane; host relationship, as mentioned above, not clear, nor has the cassowary involved been determined to species (there are 3 species of cassowaries in New Guinea, all belonging to Casuarius which is the only genus of the family
Casuariidae). If cassowaries prove to be the real host, the modification of thoracic and abdominal chaetotaxy and the reduction of tarsal claws and pulvilli in the new species may be construed as an adaptation to the short scanty feathers of these birds.

Systematics. For the inclusion of the new species, a new couplet may be added to the key on p. 48, between couplets 5 and 6; the "6" at end of couplet 1, changed to "Sa"; and the "6(1)" at beginning of couplet 6, changed to "6(5a).

5a (1). No laterocentral setae and bristles, prescutum entirely bare except for single series of setae arranged closely along its lateral margins; cell 2bc more than 1/2 as long as lbc; preapical tooth of tarsal claws closer to apical tooth than to heel. Antica group. New Guinea............................... antica

Fig. 191-195. Icosta (Ornithoponus) antica Maa, ♂: 191, head in front view; 192, palpus; 193, thorax in dorsal view; 194, wing; 195, hind tarsal claw.
Since *antica* is the sole representative of an isolated group, comparison against its con-
genres will be superfluous. A more detailed description follows.

♂. **Color** dark, wing uniformly fuscous, anterior veins brown, 3A similar in color to
2A. **Head** (fig. 191): Occipital margin straight; vertical bristle as long as notopleural
bristle; postvertex short, truncate anteriorly, clearly separated laterally from inner orbits,
median fovea virtually undefinable; postorbit moderately long, rather similar to that in
*nigra* Perty. Face very wide, slightly widened at both ends; inner orbit raised, with
uniseriate orbital setae. Frons proper short, deeply roundly notched at middle; frontal
process in dorsal view broad at base, gradually narrowed apicad and with distinctly
curved inner margin, in profile very gently rounded off into anterior margin of vibrissal
area which is densely fringed with strong biseriate setae of uniform length. Palpus (fig.
192) ca as long as mediovertex, in profile gently curved and gently narrowed apicad.
Vibrissal bristle single, distinctly longer and stouter than any other bristle on head and
thorax. Gula posteriorly lined with long fine setae. Eye in lateral view of head widest
near lower end. **Thorax** (fig. 193): Pronotum fairly long (for the genus) and narrow
(not reaching laterally to level of inner margins of humeral calli). Anterior thoracic
spirecle dorsolateral; humeral callus densely covered with setae of varied length and robustness. Prescutum densely finely striate all over, with 12± moderately long setae at each side arranged in single series (1 or 2 setae may be out of alignment) closely along lateral margin (i.e., between anterior spiracle and notopleural bristle), elsewhere of surface bare; transverse mesonotal suture oblique, hence median length of scutum equal to that of scutellum; prescutellar setae black, strong; scutellum with deep narrow median fovea and evenly and strongly curved posterior margin. Anepisternum, in dorsal view of thorax, distinctly widened posteriorly, with posterolateral corner much surpassing level of basal sclerites of wing in repose, surface setose, no strong bristles nor spines. Mesopleurum concavity fairly deep; posterior part of mesopleuron with numerous short spines, practically no setae. Metapleurotergal callus with an oblique series of 5-6 strong setae plus a number of irregularly arranged ones. Prosternum triangular, ca as long as wide, moderately sclerotized, with 3 pairs of fairly strong black setae. Mesosternum anteriorly with pair of strong bristles and posteriorly with pair of submedian patches each of 4-5 fine short setae. Median length of metabasisternum much smaller than of corresponding furcasternum, latter with posterior margin evenly gently convex.

Wing (fig. 194) 7.2 mm long, surface (incl. alula) uniformly setulose except a linear strip behind vein 3A; cell 2bc ca 2× as wide and more than 1/2 as long as 1bc, 2nd abscissa of R4,5 ca 2× as close to R2+3 as to M1+2, extreme apex of R4,5 strongly curved to meet C, other details of venation as figured.

Legs with setae much sparser than in nigra; coxa 1 almost entirely covered with short spines; femur 1 weakly swollen, anterior surface traversed at mid-length by a series of 2-3 bristles, setae rather evenly distributed, those basad to bristle-series shorter and more or less erect. Tibia 2 ventrally with 4± preapical spines in single series. Basitarsus 2 ventrally with 4-5 peg-like spines in addition to ordinary spines and setae; basitarsus 3 slightly longer than 3 following segments together. Tarsal spines 1.1.2.0/3.3.2.1/14-16.5.5.4. Pulvilli each less than 1.5× as long as wide; claws (fig. 195) very small. Abdomen finely sparsely setose on dorsum, no spines on membrane and sclerites; tergite 3 absent, tergite 6 shallowly emarginate posteriorly and with 10± pairs of bristles; laterite 3 very distinct, oblong, slightly more than 2× as long as wide; gonapophyses much smaller and anal ring much shorter than in nigra; other details as in fig. 196-197. ♀ unknown.