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(The pages of the publication follow this cover sheet)

A STUDY OF THE TYPES OF SOME LITTLE-KNOWN GENERA OF DIASPIDIDAE WITH DESCRIPTIONS OF NEW GENERA (HEMIPTERA : COCCOIDEA)

By N. S. BORCHSENIUS

AND

D. J. WILLIAMS

SYNOPSIS

Although the type species of most genera of the Diaspididae are now known, there are a few still almost completely unknown since their original descriptions.

In all, the type species of 28 genera of which 8 are new are discussed and illustrated, and they are distributed in different tribes as follows : Diaspidini 15 ; Parlatoriini 4 ; Aspidiotini 9.

INTRODUCTION

One of the main difficulties affecting the study of the Coccoidea is the insufficient knowledge of the type species of many genera. This deficiency is very acute in some families. In the Diaspididae, however, considerable progress was made by Ferris (1936–41) who illustrated most of those known at that time but some important type species were not available to him and hence some of the genera are still unknown.

With the ever increasing number of species and genera being described, it seems essential that the little-known type species of genera should be redescribed when available and some of the gaps are filled by the present paper. The type species of some recent genera are also redescribed with the emphasis on illustrations. Obviously many more genera are still to be described and our knowledge of the group will be incomplete, probably for a considerable time. Some species have been studied which do not fit comfortably in any known genus and, as their characters are so distinctive, new genera have been erected for them.

The present work is based on a study made by the authors in London and Leningrad of types, paratypes or authentic material in the British Museum (Natural History) and in the Zoological Institute of the Academy of Sciences of the U.S.S.R.

Material available in the British Museum (Natural History) of *Aspidiotus corokiae* Maskell and *Mytilaspis intermedia* Maskell was too poor for critical study and further material has kindly been made available from the Maskell collection by Dr. W. Cottier of the Department of Scientific and Industrial Research, Nelson, New Zealand to whom the writers are much indebted.

Only adult females of *Doriopus bilobus* Brimblecombe were available but Dr. A. R.

Brimblecombe of the Department of Agriculture and Stock, Brisbane, Queensland, has kindly sent second stage females and further adults for study for which the authors are grateful.

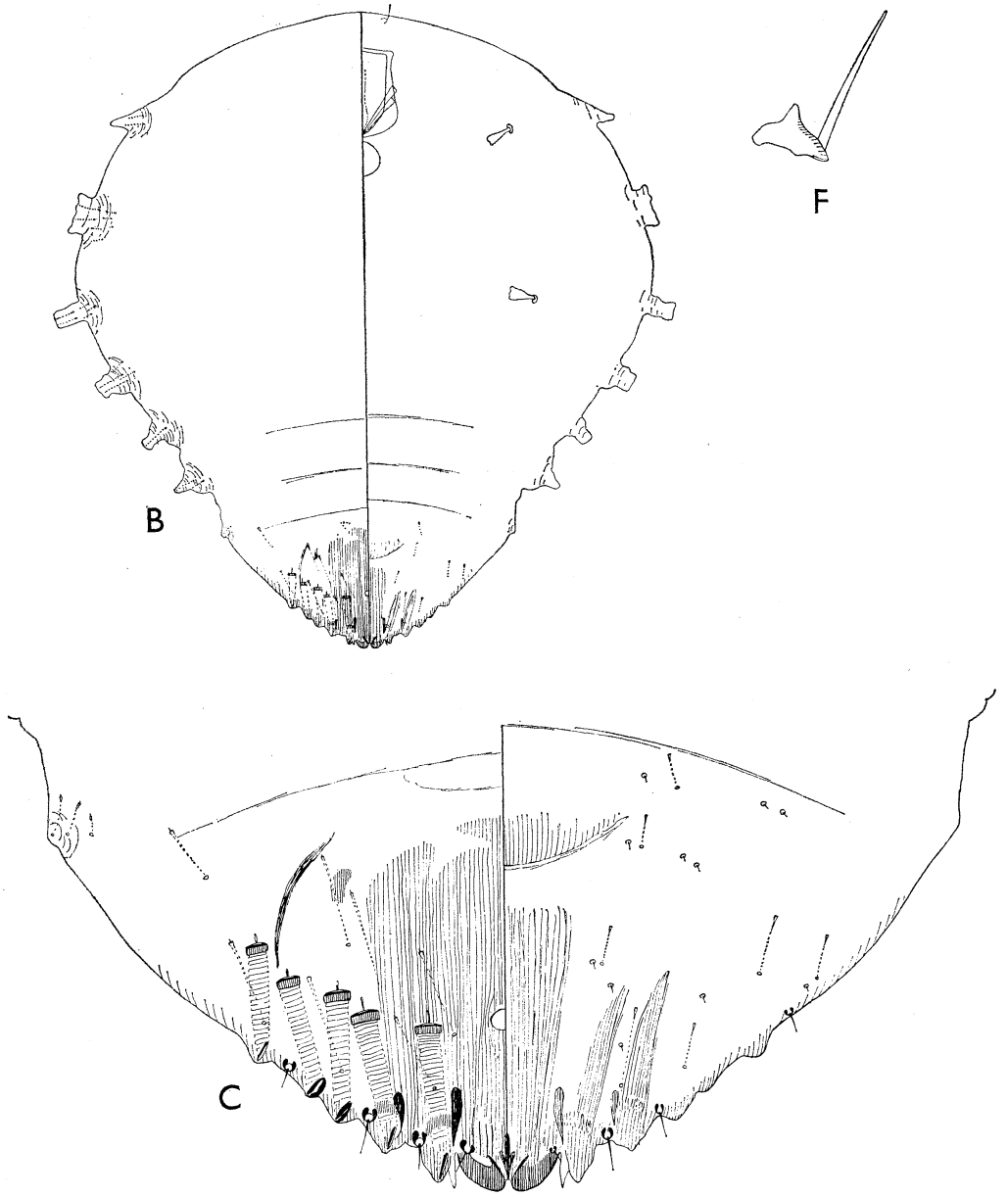

FIG. 1. *Alioides tuberculata* (Laing). Holotype in the British Museum (Nat. Hist.) London. Australia : Northern Territory, Darwin, on *Melaleuca leucadendra*, 26.vi.1917 (*G. F. Hill*).

GENERA OF THE TRIBE DIASPIDINI

ALIOIDES Brimblecombe

(Text-fig. 1)

Alioides Brimblecombe, 1958 : 91.

Type species : *Aspidiotus tuberculatus* Laing, 1929, Australia.

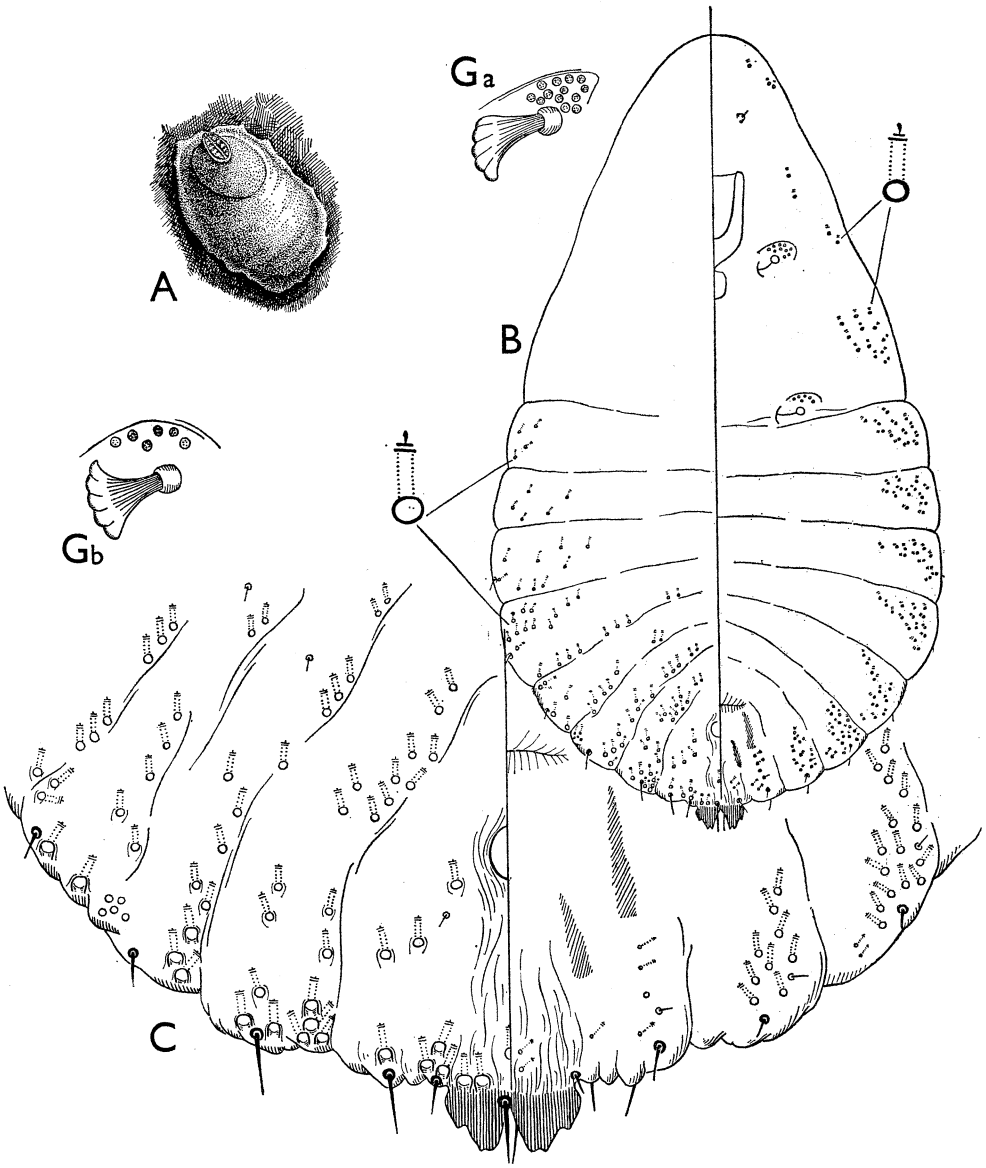

FIG. 2. *Artemisaspis artemisiae* Borchsenius. Holotype in the Zoological Institute of Academy of Sciences of the U.S.S.R., Leningrad. U.S.S.R. South Tadzhikistan, on stems of *Artemisia* sp., 15.vi.1944 (*N. S. Borchsenius*).

Although the only included species was originally described in the genus *Aspidiotus* Bouché, it was placed in the tribe Diaspidini by Brimblecombe. The peculiar combination of characters makes a positive tribal placing very difficult. Although the marginal tubercle-like processes on the thorax and prepygidial segments permit easy recognition, the most interesting characters are to be found on the pygidium. The inner end of each marginal duct is heavily sclerotized and it is difficult to deter-

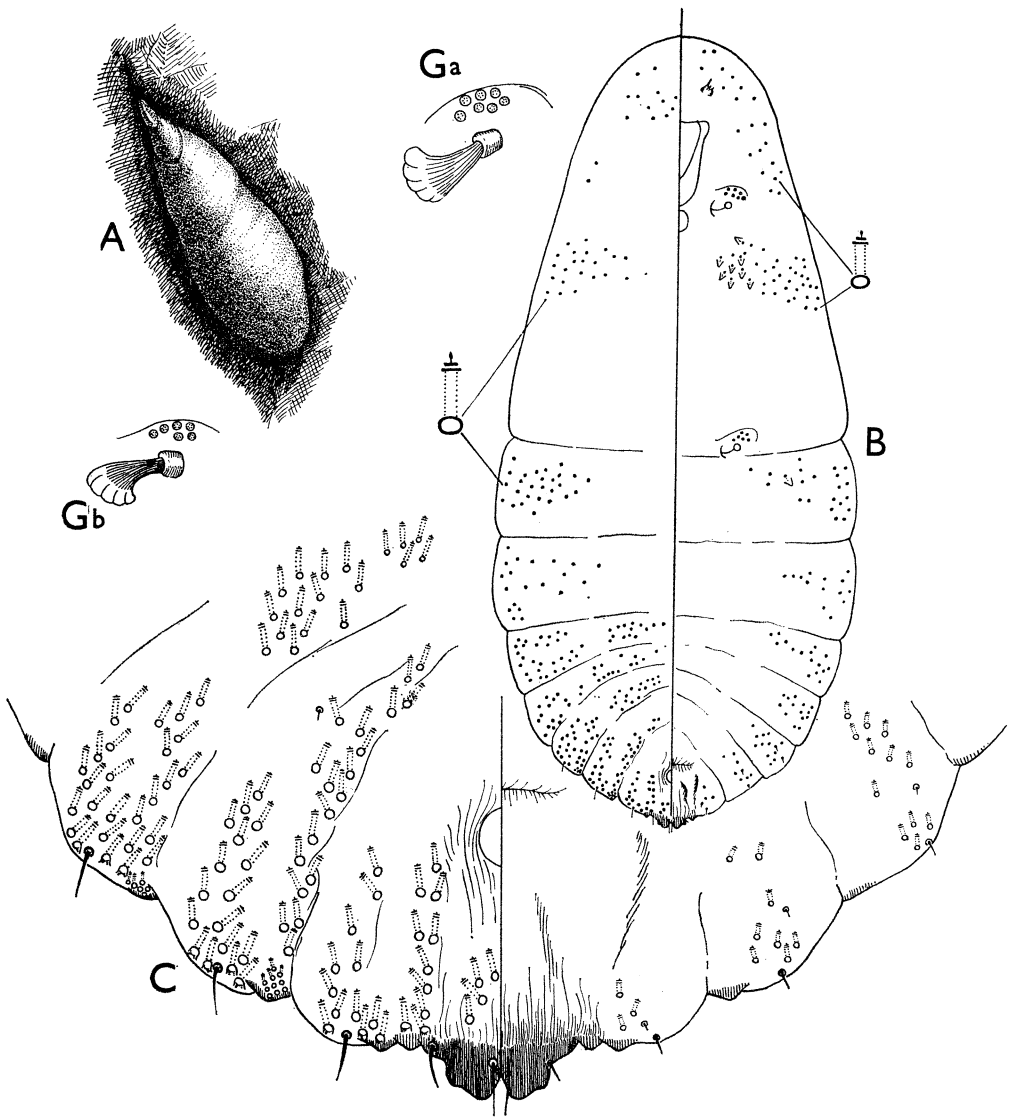

FIG. 3. *Artemisaspis farsetiae* (Hall), type of the genus *Eremohallaspis* Bodenheimer. Holotype in the British Museum (Nat. Hist.) London. Egypt: Masara, on stems of *Farsetia aegyptiaca*, 6.iv.1928 (*W. J. Hall*).

mine whether there are actually one or two bars. Each duct has its opening on a lobe-like structure which, although sclerotized, resembles the lobe-like structures which are often well developed between the lobes of *Diaspis* and related genera. They are not gland spines as noted by Brimblecombe. The paraphyses are typical of many in the Aspidiotini. As the second stage female is almost a replica of the adult female it has not been possible to come to any further conclusions and the genus is left in the Diaspidini.

ARTEMISASPIS Borchsenius

(Text-figs. 2, 3)

Artemisaspis Borchsenius, 1949 : 736.
Artemisaspis Borchsenius ; Borchsenius, 1950 : 202.
Eremohallaspis Bodenheimer, 1951 : 330.
Artemisaspis Borchsenius ; Balachowsky, 1953 : 29.
Eremohallaspis Bodenheimer ; Balachowsky, 1954 : 157.

Type species : *Artemisaspis artemisiae* Borchsenius, 1949, Tadzhikistan.

The genus *Artemisaspis* Borchsenius contains two species *A. artemisiae* Borchsenius and *A. farsetiae* (Hall) distributed in Central Asia and North Africa. In the arrangement of the dorsal ducts and the absence of marginal macroducts, the genus comes closest to *Contigaspis* MacGillivray but differs in the much longer pair of median lobes which have the bases contiguous.

Bodenheimer (1951) described the genus *Eremohallaspis* (Text-fig. 3) with *Coccomytilus farsetiae* Hall (1926) as type. This species is very close to *A. artemisiae* differing in the greater number of dorsal ducts on the abdomen and the presence of dorsal ducts on the cephalothorax. These differences together with others in the scale, the shape of the body and the slight differences in the median lobes, do not warrant the recognition of another genus. The name *Eremohallaspis*, therefore, is synonymized with *Artemisaspis*.

Balachowsky (1953) has suggested that the genus *Artemisaspis* is identical with *Rhizaspidiotus* MacGillivray but they are quite distinct and even belong to different tribes. A new name *Rhizaspidiotus mesasiaticus* suggested by Balachowsky (1953) in place of *Artemisaspis artemisiae* Borchsenius (**syn. n.**) was not necessary and hence is a synonym of the latter.

CHLIDASPIS Borchsenius

(Text-fig. 4)

Chlidaspis Borchsenius, 1949 : 736.
Chlidaspis Borchsenius ; Borchsenius, 1950 : 202.
Tecaspis Hall ; Balachowsky, 1954 : 369. [*Ex parte.*]

Type species : *Phenacaspis prunorum* Borchsenius, 1939, Armenia.

The genus *Chlidaspis* Borchsenius, represented by a single species known from Central Asia and the Near East, belongs to the group comprising the genera *Tecaspis* Hall (1946*a*), *Voraspis* Hall (1946*a*) and *Rolaspis* Hall (1946*a*). It differs from these

genera in that the median lobes form a deep notch at the apex of the pygidium and the inner distal edges are distinctly divergent. Furthermore in *Chlidaspis* the ventral surface lacks the small paraphyses at the bases of the lobes which are, apparently, always present in the other genera.

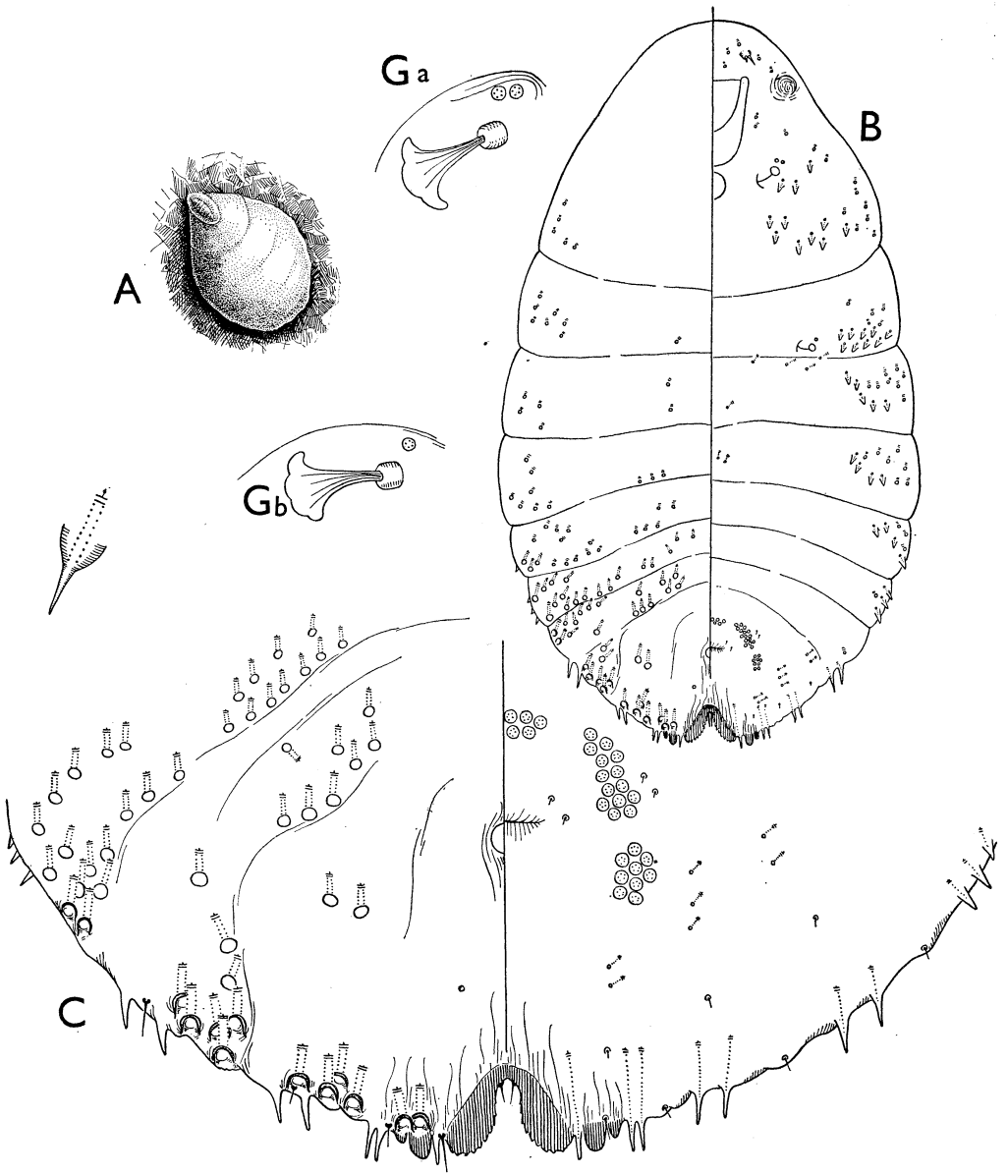

FIG. 4. *Chlidaspis prunorum* (Borchsenius). Holotype in the Zoological Institute of Academy of Sciences of the U.S.S.R., Leningrad. U.S.S.R.: Armenia, on branches and leaves of *Prunus domestica*, 5.ix.1932.

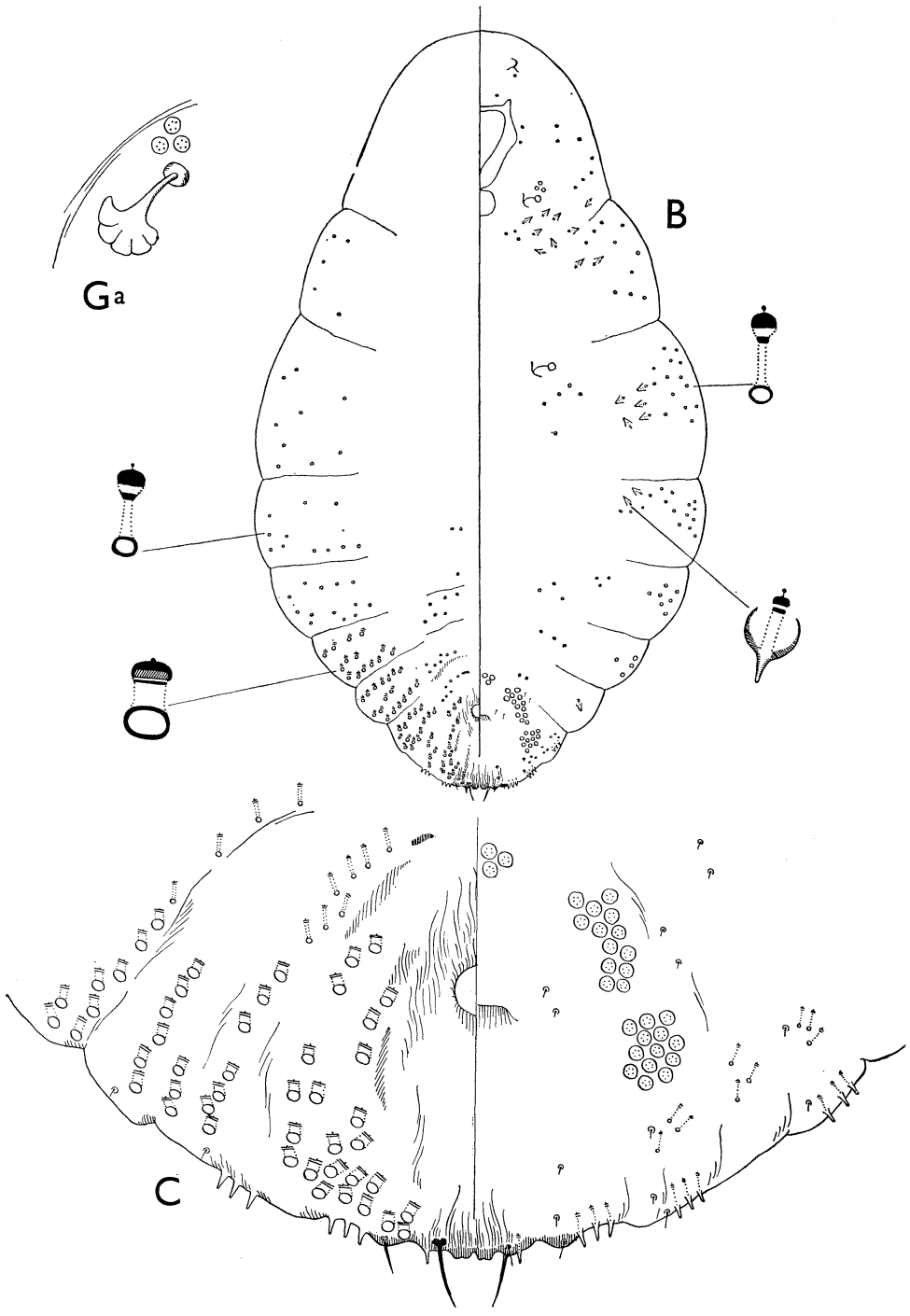

FIG. 5. *Contigaspis subnudata* (Newstead). Type in the British Museum (Nat. Hist.), London. South West Africa : Great Namaland, Brukkarossberg, (*L. Schultze*).

Balachowsky (1954) has synonymized the name *Chlidaspis* with *Tecaspis* Hall but the differences given above justify the separation of the two genera.

The species *Voraspis adlei* described by Balachowsky & Kaussari (1955) from Iran is identical with *Chlidaspis prunorum* (**syn. n.**) and the former name is here sunk as a synonym.

CONTIGASPIS MacGillivray

(Text-figs. 5, 6)

Contigaspis MacGillivray, 1921 : 309.
Contigaspis MacGillivray ; Ferris, 1936 : 21.
Contigaspis MacGillivray ; Lindinger, 1937 : 182.
Contigaspis MacGillivray ; Hall, 1946*a* : 509.
Contigaspis MacGillivray ; Borchsenius; 1950 : 204.
Eremaspis Bodenheimer, 1951 : 330.
Contigaspis MacGillivray ; Balachowsky, 1952 : 98, 101.
Contigaspis MacGillivray ; Balachowsky, 1954 : 410.
Contigaspis MacGillivray ; Ferris, 1955 : 42.
Contigaspis MacGillivray ; Kaussari, 1959 : 132.

Type species : *Chionaspis subnudata* Newstead, 1912, South West Africa.

The genus *Contigaspis* is a good one with eight or nine species widely distributed in Africa, the Near East and South and Central Asia. It belongs to the group of genera consisting of *Sclopetaspis* MacGillivray (1921), *Unachionaspis* MacGillivray (1921), *Balaspis* Hall (1946*a*), *Neochionaspis* Borchsenius (1947), *Artemisaspis* Borchsenius (1949) and *Aloaspis* Williams (1955), the adult females of which have a rounded pygidium and no typical marginal macroducts. The genus *Contigaspis* differs from these genera in possessing poorly developed median lobes which have the bases, at least, contiguous and very often resemble the lobes of *Pinnaspis* Cockerell.

Bodenheimer (1951) described the genus *Eremaspis* with *Pinnaspis zillae* Hall, 1925 as type species. This species (Text-fig. 6), however, is congeneric with the type of *Contigaspis* of which the name *Eremaspis* is regarded as a synonym.

COOLEYASPIS MacGillivray

(Text-fig. 7)

Cooleyaspis MacGillivray, 1921 : 308.
Cooleyaspis MacGillivray ; Ferris, 1936 : 21.
Cooleyaspis MacGillivray ; Hall, 1946*a* : 510.

Type species : *Chionaspis praelonga* Newstead, 1920, Uganda.

This is a distinct genus with, so far, only a single species. The distinctive features are the deeply notched median lobes, yoked at the base, and the second lobes well developed, the lobules set wide apart with the inner lobules wider and longer than the median lobes. The dorsal ducts form a submedian row on segment 6 and transverse

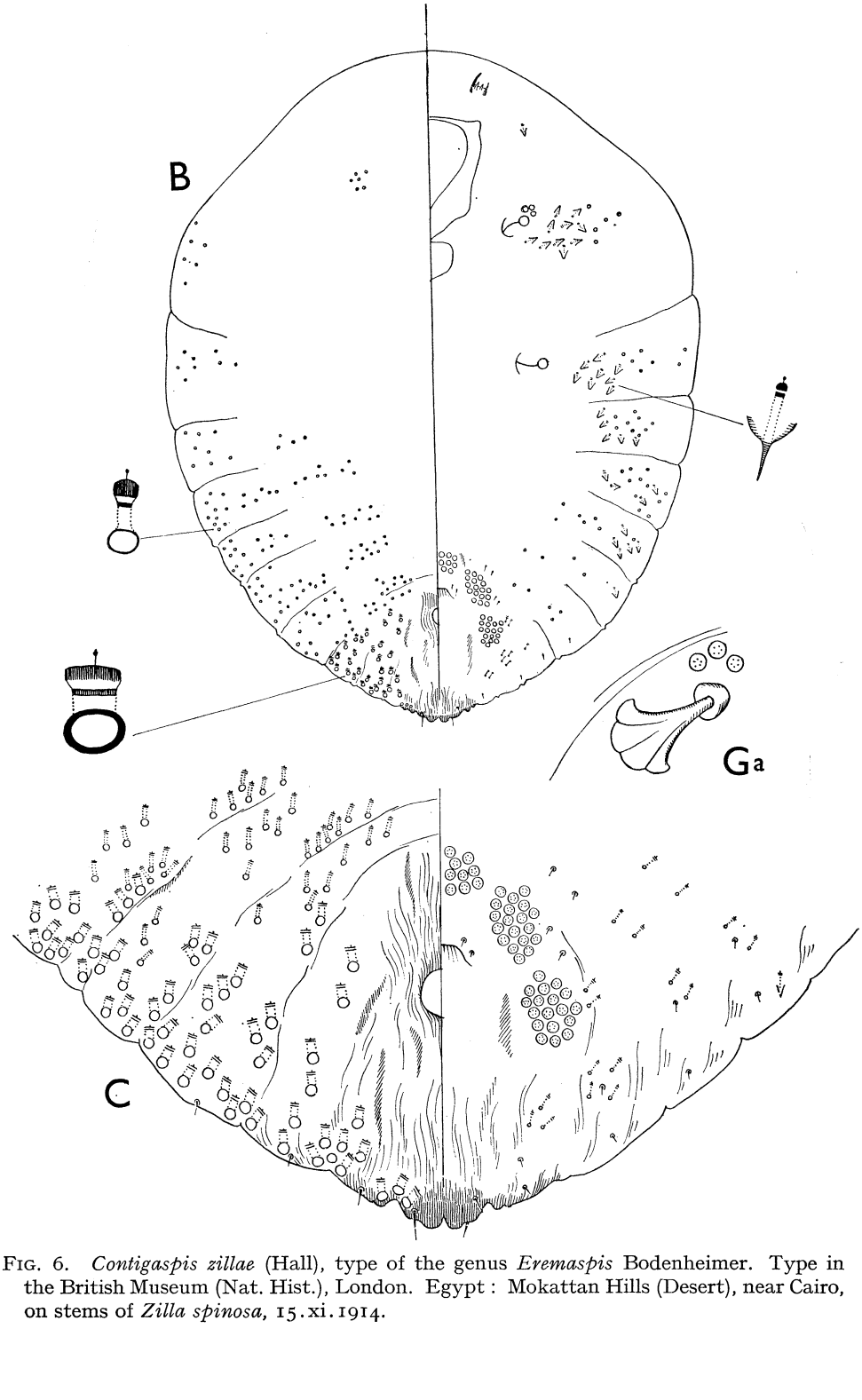

FIG. 6. *Contigaspis zillae* (Hall), type of the genus *Eremaspis* Bodenheimer. Type in the British Museum (Nat. Hist.), London. Egypt : Mokattan Hills (Desert), near Cairo, on stems of *Zilla spinosa*, 15.xi.1914.

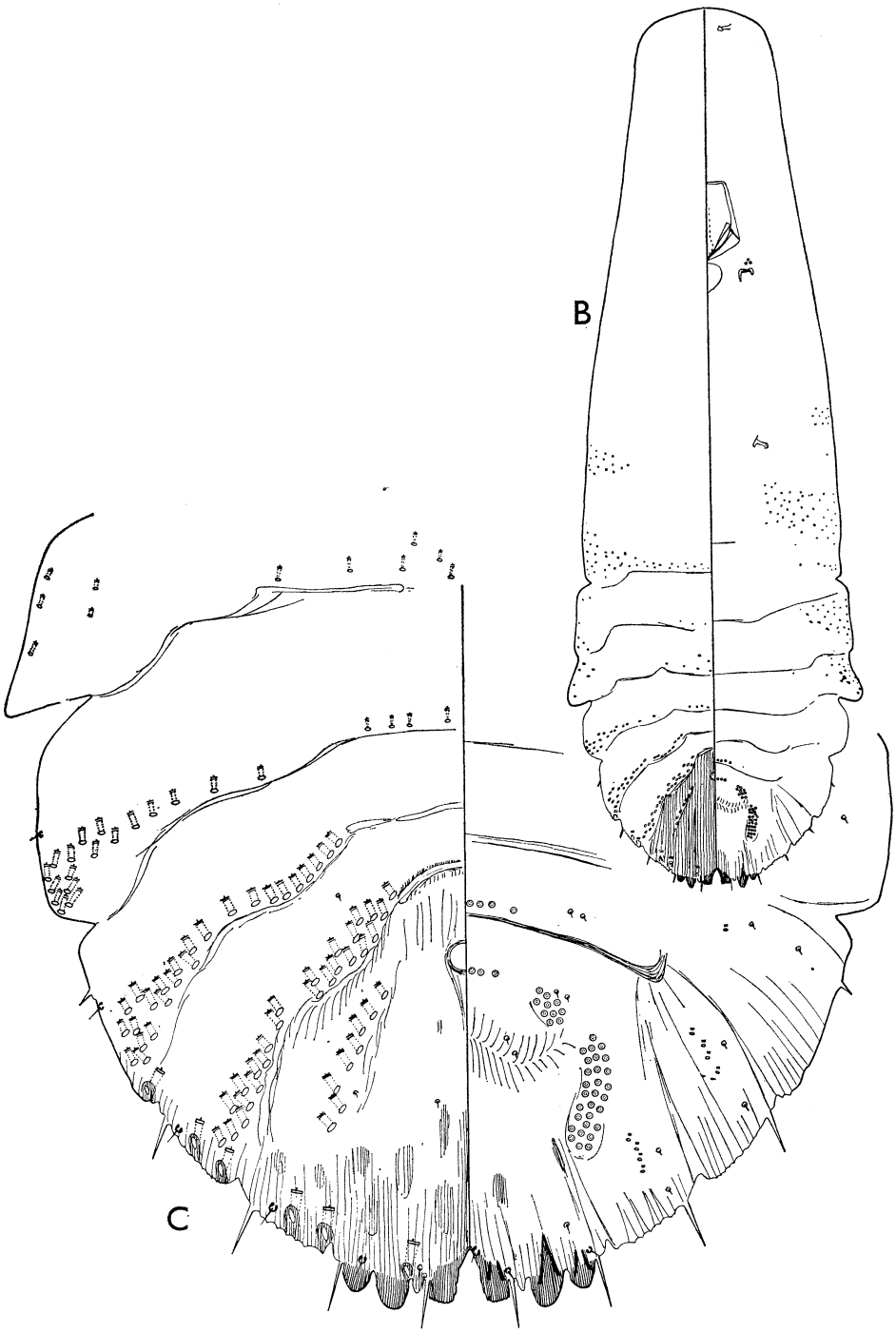

FIG. 7. *Cooleyaspis praelonga* (Newstead). Type in the British Museum (Nat. Hist.), London. Uganda: Sesse Is., Bufumira Is., on unknown tree, 12.x.1918 (*C. C. Gowdey*).

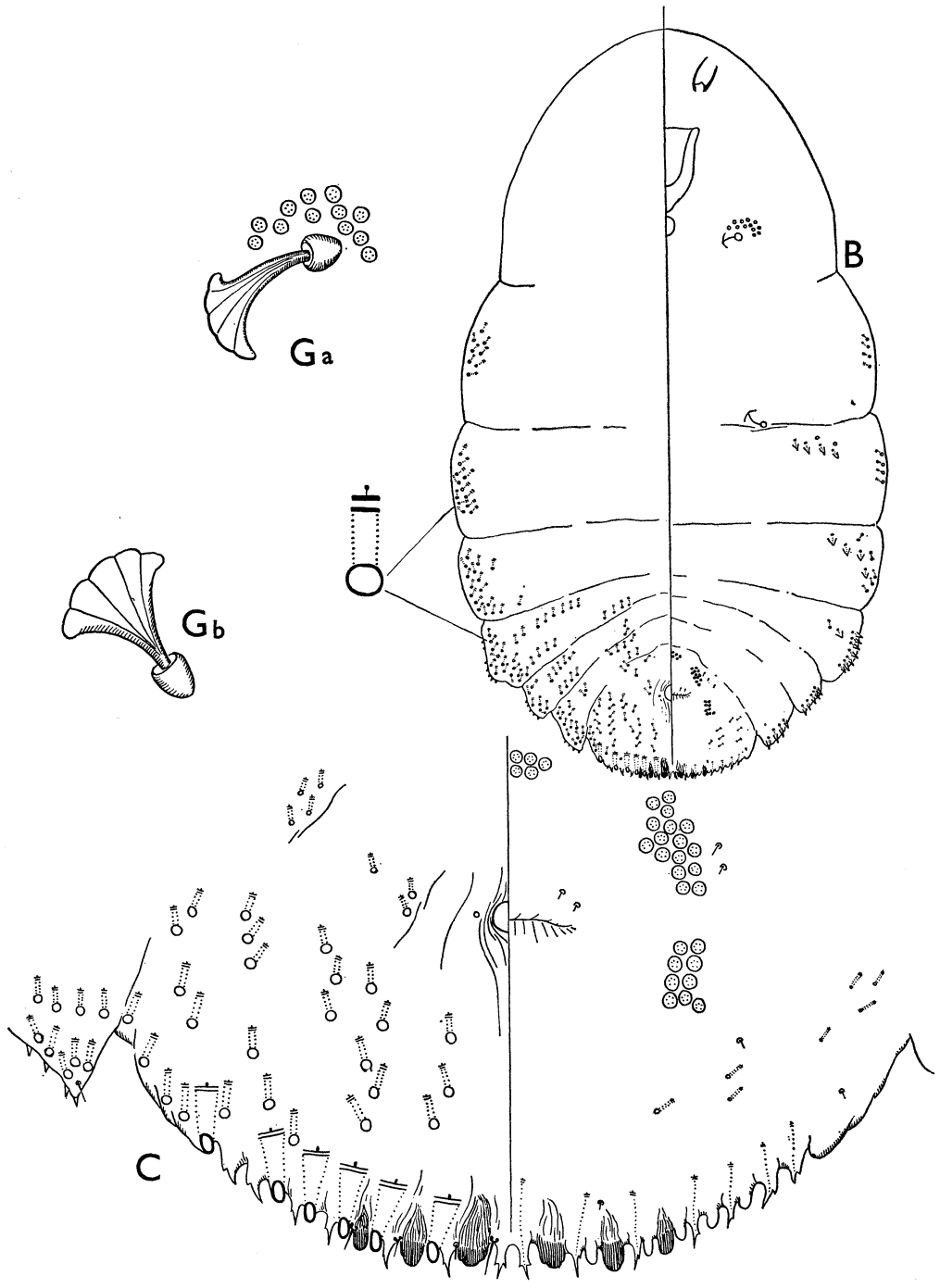

FIG. 8. *Eulepidosaphes marshali* (Laing). Holotype in the British Museum (Nat. Hist.), London. New Zealand: Wellington, Day's Bay, on *Freycinetia banksi*, 29.vii.1923 (*G. A. K. Marshall*).

rows on the anterior segments. Perivulvar pores present in three groups with a transverse median supplementary group of 7–12 pores.

This genus comes very close to the genera *Rolaspis* Hall and *Voraspis* Hall but differs from both in the median lobes forming a deep notch in the pygidium. The single supplementary group of perivulvar pores is distinctive but other supplementary groups are present in some species of *Rolaspis* and *Voraspis*. Although the marginal pygidial ducts are larger than the dorsal ducts this is also true of certain species of *Rolaspis* and it may be that some species now placed in *Rolaspis* could be transferred to *Cooleyaspis*. The types of both genera, however, are quite distinct.

EULEPIDOSAPHES gen. n.

(Text-fig. 8)

Type species : *Lepidosaphes marshali* Laing, 1925, New Zealand.

Body of adult female elongate oval. Pygidium broadly rounded, flattened apically ; with three pairs of well developed lobes, none bilobed. Gland spines wide with one or more serrations. Marginal macroducts large, six in number on either side of the pygidium. Dorsal ducts two-barred, small and numerous ; in submarginal groups on thorax and anterior abdominal segments and in definite transverse rows on other abdominal segments. Ventral surface with microducts and small gland spines. Perivulvar pores in five groups. Anterior spiracles each with a group of pores.

Scale of adult female elongate, broad at posterior end, light brown, the two exuviae terminal.

The females of this genus differ from those of *Lepidosaphes* Shimer and allied genera in having the second and third lobes not bilobed. The gland spines are similar to those of the genus *Symeria* Green (1929) but in other respects *Eulepidosaphes* differs in the number and form of the lobes and in the very large marginal macroducts of the pygidium.

LAINGASPIS gen. n.

(Text-fig. 9)

Type species : *Poliaspis lanigera* Laing, 1929, Australia.

Body of adult female oval. Pygidium slightly pointed at apex, with one pair of broadly placed median lobes. Gland spines wide. Marginal macroducts absent. Dorsal ducts two-barred, each with a heavily sclerotized rim surrounding orifice, resembling dorsal ducts of *Parlatoria*, arranged in a wide submarginal band ; smaller ducts with orifice without sclerotized rim forming groups and short rows on the posterior part of the body. Ventral surface with microducts and groups of small gland spines. Perivulvar pores in five groups and with a supplementary row of three groups anteriorly. Anterior spiracles with a group of pores.

Scale of adult female white, pyriform, granular, with the two yellow exuviae terminal.

Male scale elongate, white, granular, uncarinated, with terminal exuviae yellow.

The females of the genus *Laingaspis* differ from others in the tribe Diaspidini by the position of the dorsal ducts and by the peculiar sclerotized rim surrounding the orifice of each pygidial duct.

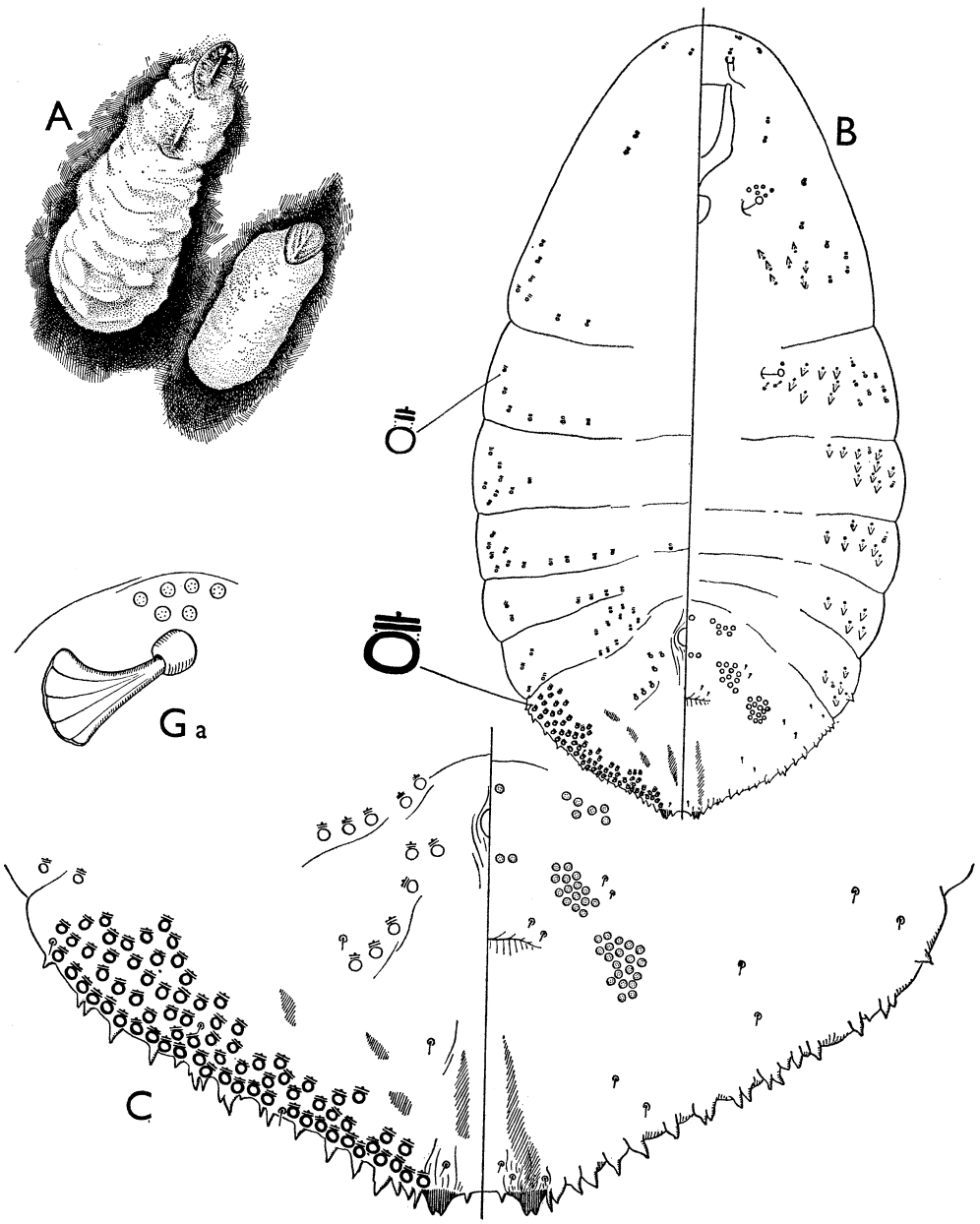

FIG. 9. *Laingaspis lanigera* (Laing). Type in the British Museum (Nat. Hist.), London. Australia : Northern Territory, Darwin, on leaves of ? mangrove.

LEONARDASPIS MacGillivray

(Text-fig. 10)

Leonardaspis MacGillivray, 1921 : 274.
Leonardaspis MacGillivray ; Ferris, 1936 : 22.

Type species : *Mytilaspis wilga* Leonardi, 1903, Australia.

This genus is distinct and will probably have other Australian species added to it. The distinctive features are the rounded pygidium, with only a single pair of median lobes, set well apart and with definite marginal macroducts. In this respect it comes close to *Berlesaspis* MacGillivray, another Australian genus, but differs in lacking vestigial legs and in possessing a supplementary row of perivulvar pores making eight groups altogether.

PROTARGIONIA Leonardi

(Text-fig. 11)

Protargionia Leonardi, 1911 : 280.
Protargionia Leonardi ; MacGillivray, 1921 : 306.
Protargionia Leonardi ; Ferris, 1936 : 21.

Type species : *Protargionia larreae* Leonardi, 1911, Argentina.

As the name suggests this genus was described as belonging to the *Aspidiotus* group but it is plainly a member of the Diaspidini as the type species possesses two-barred ducts. The genus is here regarded as distinct although there is a striking similarity to *Diaspis* Costa. It differs from *Diaspis* in lacking a macroduct between the median lobes, in the almost complete lack of gland spines except for one or two minute pairs lateral to the median and second lobes and in the absence of pores associated with the anterior spiracles.

The differences are, perhaps, small but are nevertheless distinctive. It may be that connecting forms will be discovered in South America where, as yet, the scale insect fauna is but little known.

ROLASPIS Hall

(Text-fig. 12)

Rolaspis Hall, 1946*a* : 531.
Rolaspis Hall ; Balachowsky, 1954 : 172, 357, 369.
Rolaspis Hall ; Ferris, 1955 : 42.

Type species : *Phenacaspis whitehilli* Hall, 1946, South Africa.

The genus *Rolaspis* is considered to be a good one. It consists of 16 species distributed throughout the Ethiopian Region. The females are characterized by the presence of two pairs of pygidial lobes, the median lobes being large and prominent, not divergent or with apices divergent ; not forming a deep notch in the pygidium but with their bases yoked together. Second lobes large, bilobed, slightly shorter than

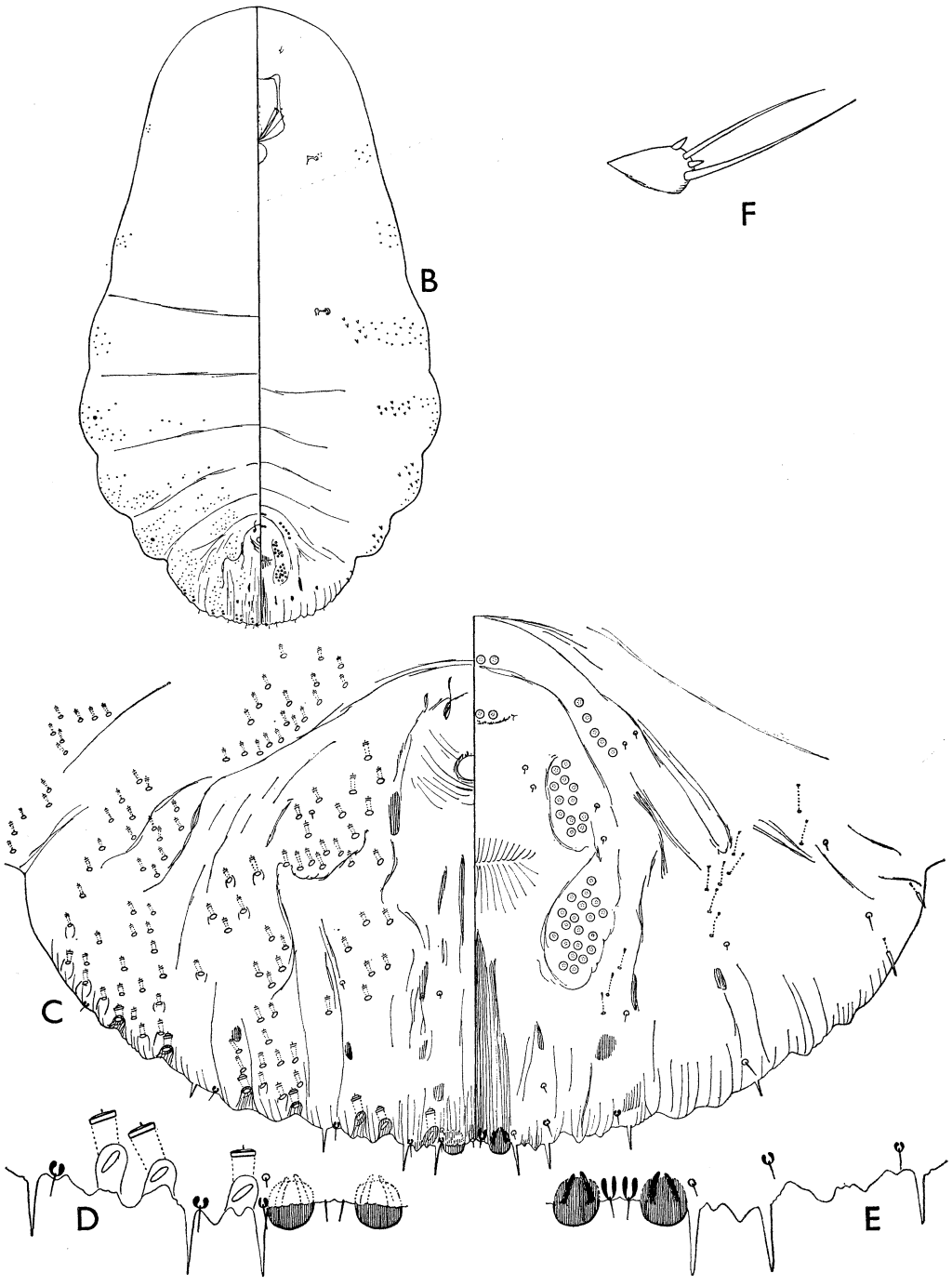

FIG. 10. *Leonardaspis wilga* (Leonardi). Type material in the British Museum (Nat. Hist.), London. Australia: New South Wales, Condobolin, on "Wilga", *Geijera parviflora*, 17.x.1900 (*W. W. Froggatt*) (No. 339).

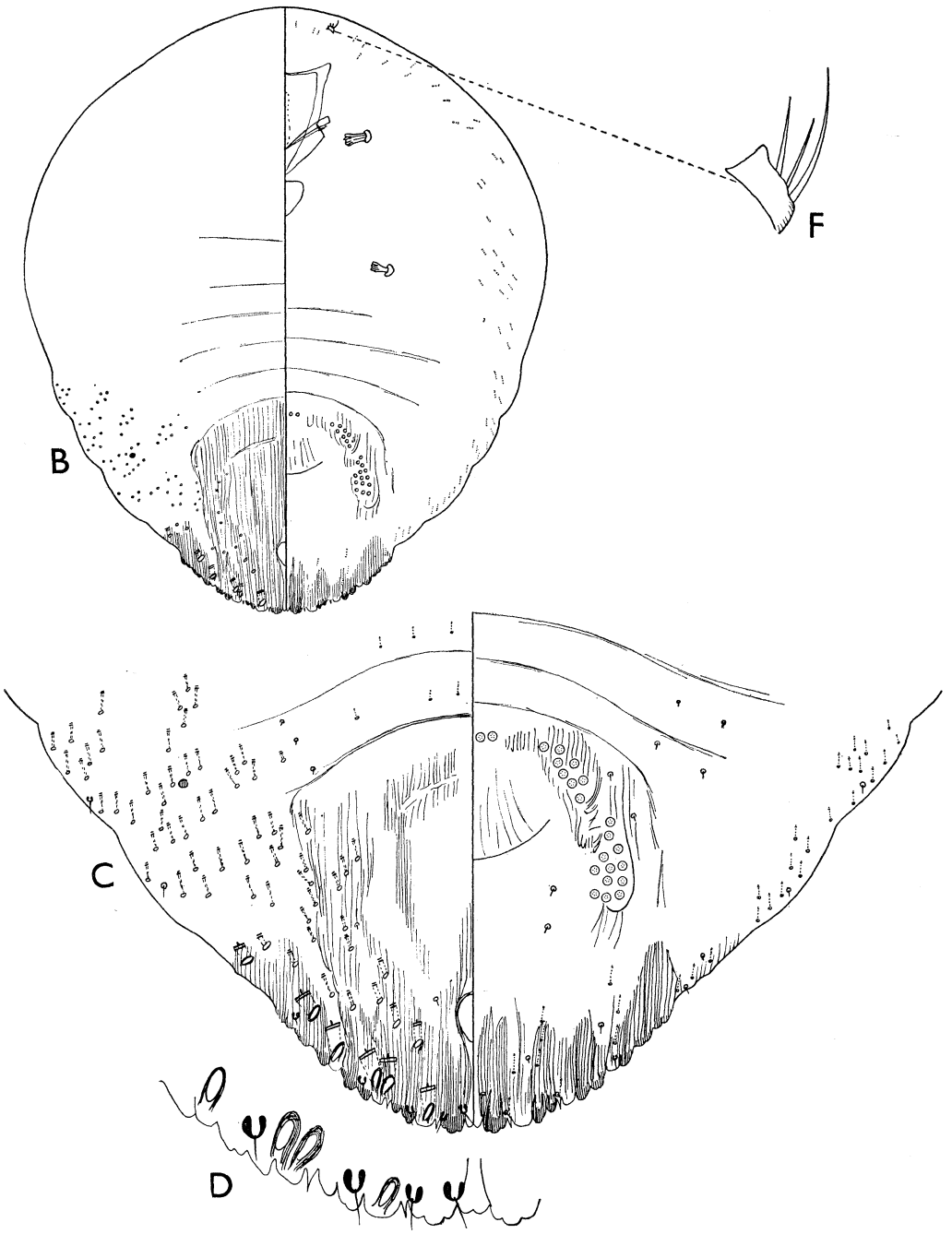

FIG. 11. *Protargionia larreae* Leonardi. Type material in the British Museum (Nat. Hist.), London. Argentina : Cacheuta, on *Larrea divaricata*, 1911.

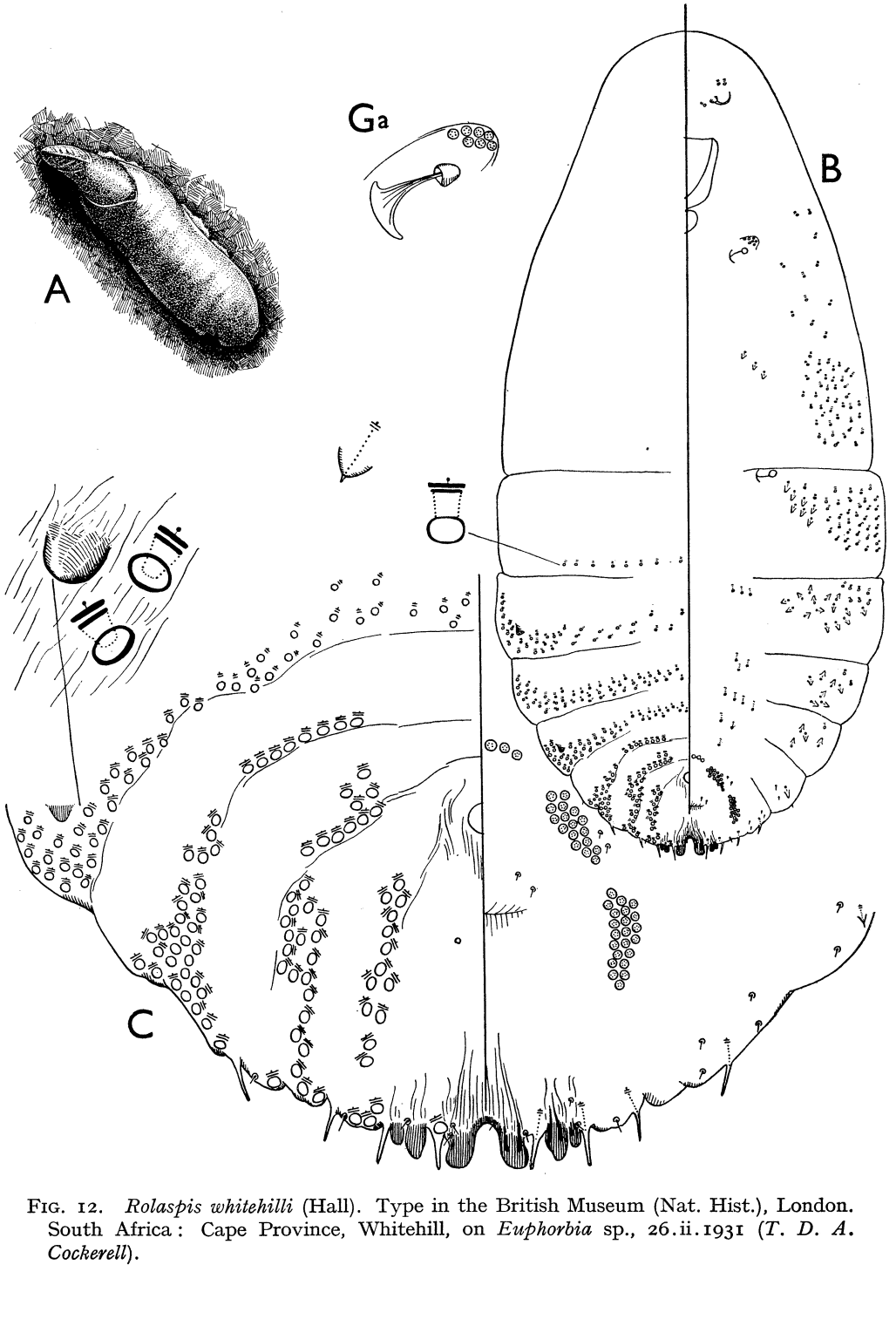

FIG. 12. *Rolaspis whitehilli* (Hall). Type in the British Museum (Nat. Hist.), London. South Africa: Cape Province, Whitehill, on *Euphorbia* sp., 26.ii.1931 (*T. D. A. Cockerell*).

the median lobes, the lobules very close together. Dorsal ducts on at least some of the prepygidial segments forming complete rows.

This genus differs from *Tecaspis* Hall in having well developed second lobes but the remarks under the genus *Cooleyaspis* should be considered.

SCRUPULASPIS MacGillivray

(Text-fig. 13)

Scrupulaspis MacGillivray, 1921 : 274.
Scrupulaspis MacGillivray ; Ferris, 1936 : 23.

Type species : *Mytilaspis intermedia* Maskell, 1891, New Zealand.

This is a distinct genus belonging to the *Lepidosaphes* group. The adult females are characterized by the pair of large median lobes with their axes set at an angle and set apart by a space about half the width of one lobe, the space occupied by a pair of short gland spines. Second and third lobes not bilobed, represented at most by sclerotized points but with the ventral surface of each lobe with prominent paraphyses. Marginal macroducts six on either side of pygidium with a submarginal macroduct on the seventh segment. Dorsal ducts small and numerous, arranged in submarginal and submedian groups. Gland spines very small, the most noticeable features being the presence of four between the second and third lobes. Perivulvar pores in five groups.

The genus *Scrupulaspis* comes closest to *Lepidosaphes* Shimer but differs in having the axes of the median lobes set at an angle, in possessing second and third lobes which are mere sclerotized points and in having very short gland spines.

VORASPIS Hall

(Text-fig. 14)

Voraspis Hall, 1946*a* : 539.
Voraspis Hall ; Balachowsky, 1954 : 356.
Voraspis Hall ; Ferris, 1955 : 42.

Type species *Chionaspis carpenteri* Laing, 1929, Uganda.

The genus *Voraspis* is a good one and consists of six species from various parts of Africa. The distinguishing features of the genus are the short median lobes only slightly notched into the apex of the pygidium. The lateral lobes are longer and bilobed, the lobules set wide apart. As mentioned by Hall (1946*a*) the dorsal ducts are separated into submarginal and submedian groups and on some of the prepygidial segments there are supplementary pores parallel to the submedian pores. The distribution of the dorsal ducts is one of the most important characters separating this genus from *Rolaspis*.

XIPHURASPIS gen. n.

(Text-fig. 15)

Type species : *Chionaspis spiculata* Green, 1919, India.

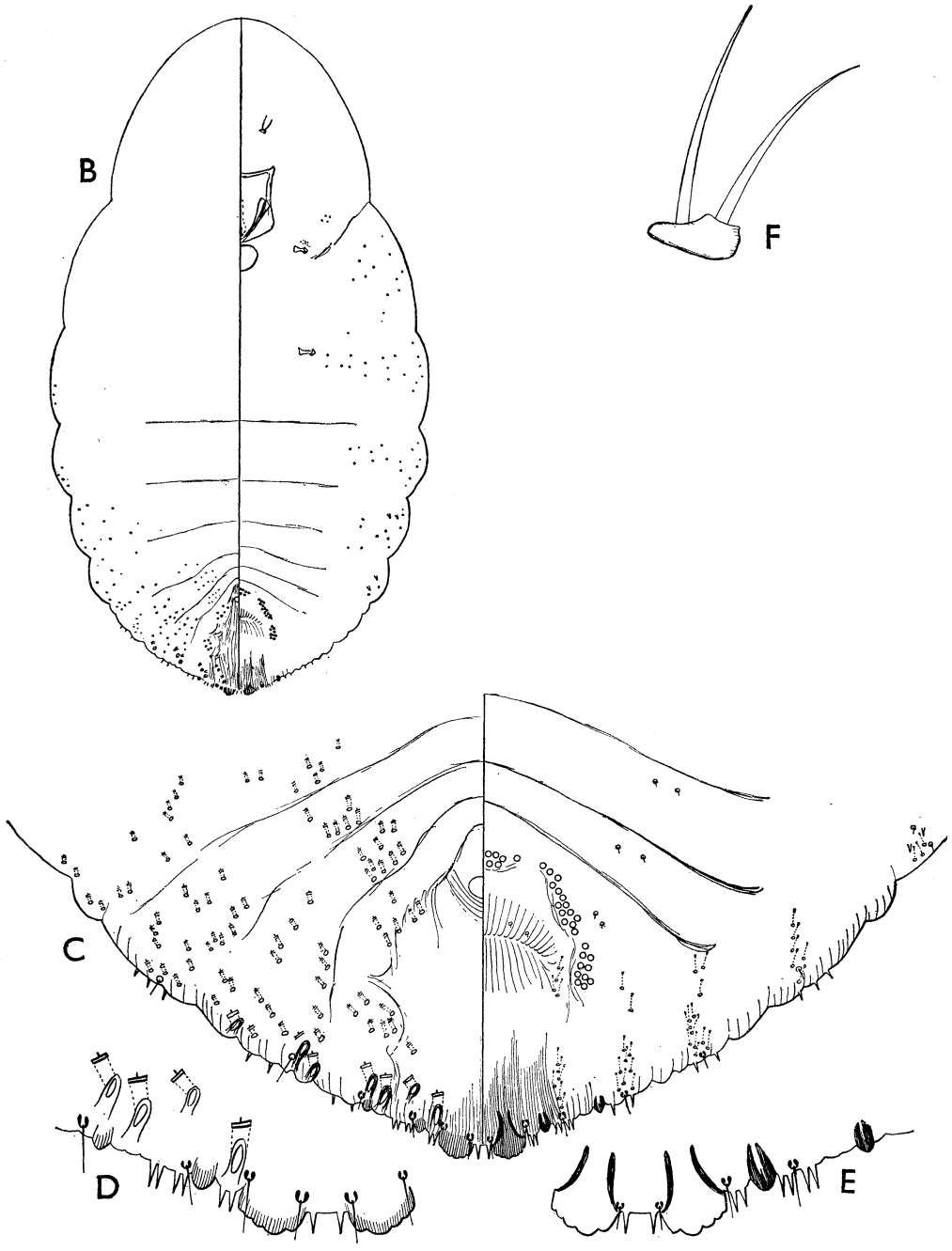

FIG. 13. *Scrupulaspis intermedia* (Maskell). Type material in New Zealand, D.S.I.R., Nelson, and type material in the British Museum (Nat. Hist.), London. New Zealand: Reefton, on *Leptospermum scoparium*.

Body of adult female narrow and long. Pygidium pointed, without lobes. Pygidial gland spines sharply pointed, seta-like. Small gland spines and ducts present on the metathorax and first abdominal segment. Dorsal ducts two-barred, numerous over almost entire surface of pygidium and forming submarginal groups and transverse rows on the first few prepygidial segments. Marginal macroducts absent. Perivulvar pores in five groups. Anterior spiracles each with a group of pores.

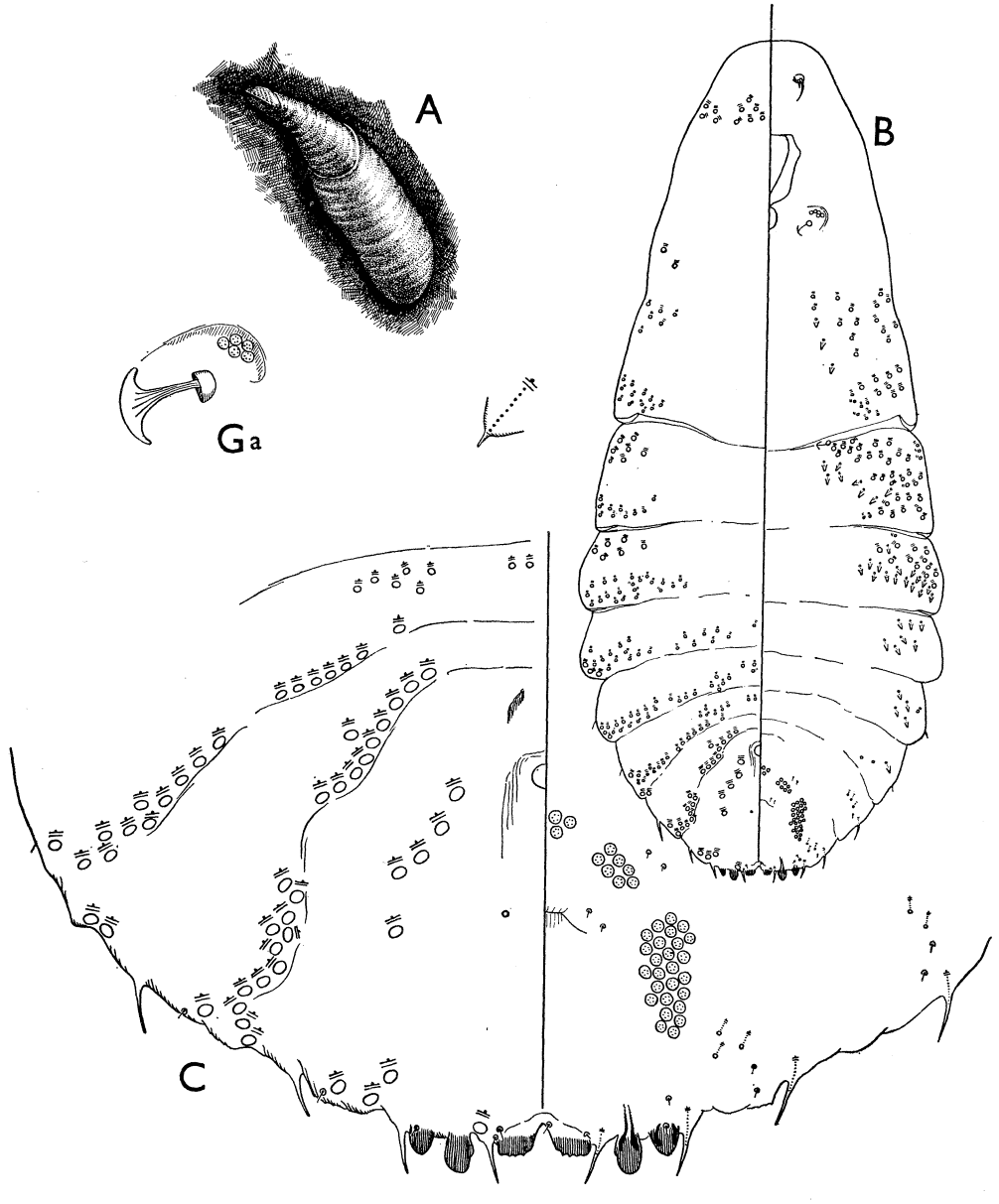

FIG. 14. *Voraspis carpenteri* (Laing). Type in the British Museum (Nat. Hist.), London. Uganda : Lake Victoria, Nkosi Is., S. Sesse, 25.v.1928 (*G. D. Carpenter*).

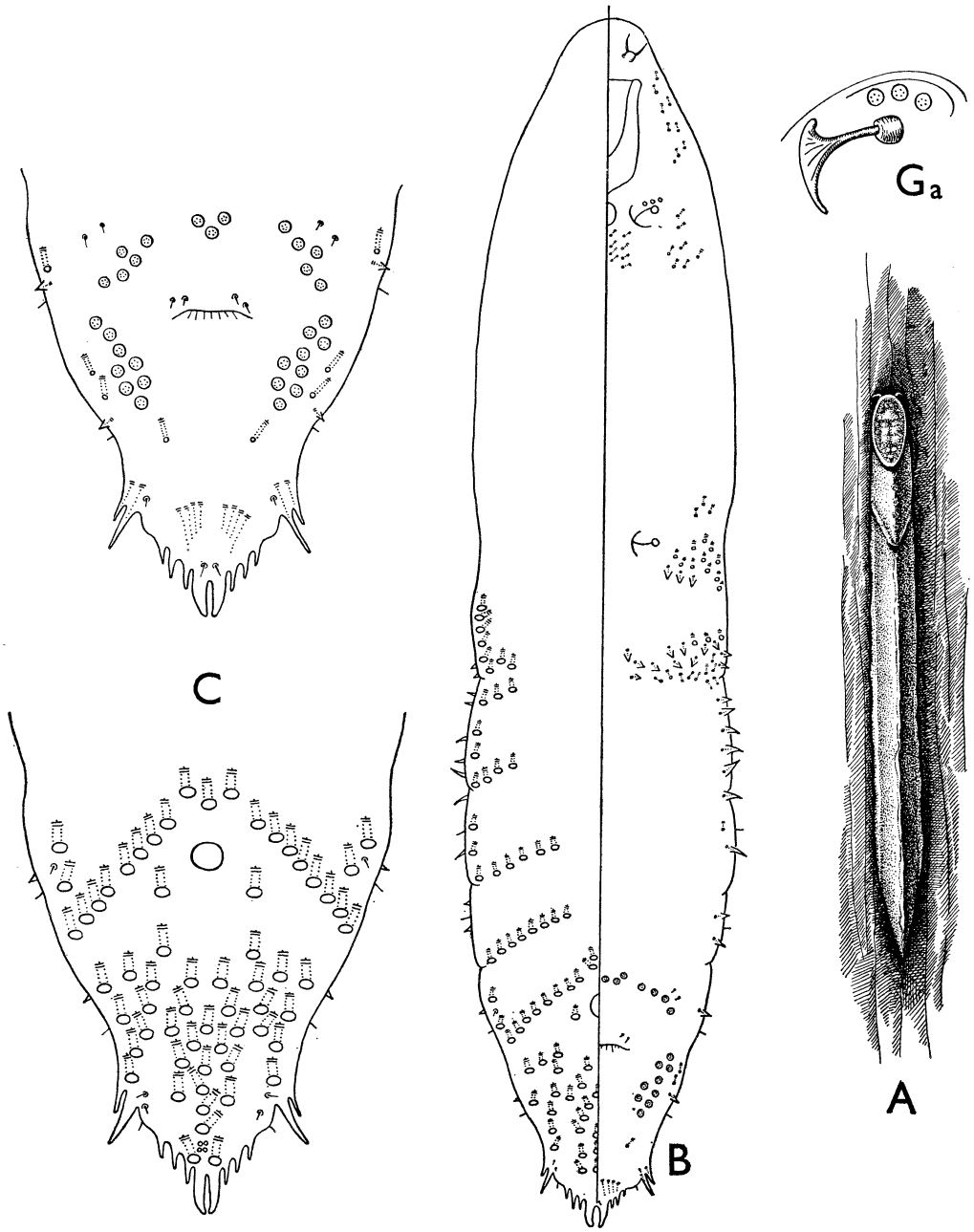

FIG. 15. *Xiphuraspis spiculata* (Green). Type in the British Museum (Nat. Hist.), London. India: Peria Ghat, N. Malabar (2,000 feet), 8.x.1917 (*T. V. Ramakrishna Ayyar*).

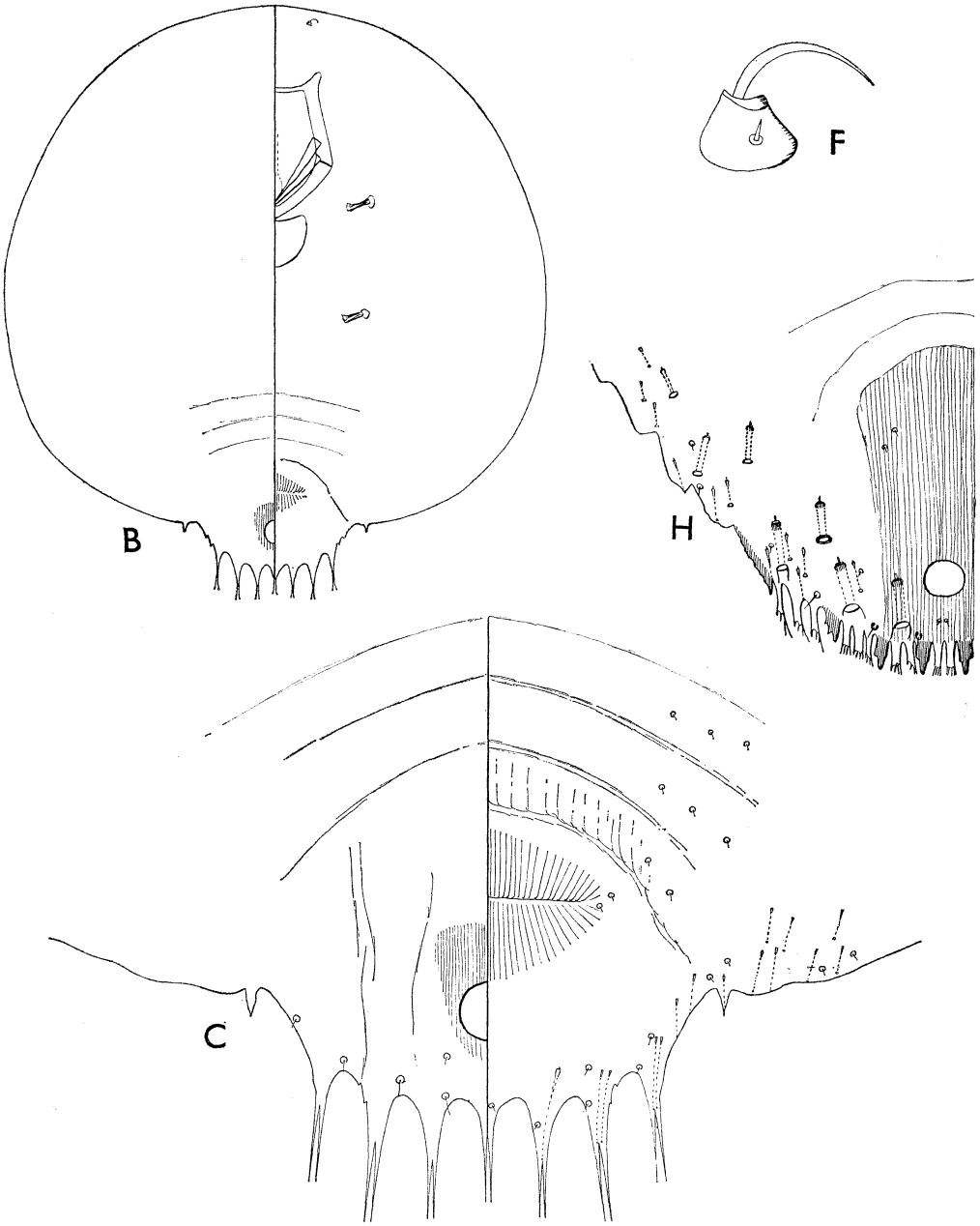

FIG. 16. *Agrophaspis buxtoni* (Laing). Holotype in the British Museum (Nat. Hist.), London. New Caledonia : Tontouta, on switch grass, vi.1925 (*P. A. Buxton*).

Scale of adult female long and narrow, white with longitudinal median carina ; the two exuviae terminal, yellowish.

A distinctive genus and apparently allied to the genus *Kuwanaspis* MacGillivray but differing in the absence of pygidial lobes and broad serrate processes.

GENERA OF THE TRIBE PARLATORIINI

AGROPHASPIS gen. n.

(Text-fig. 16)

Type species : *Aonidia buxtoni* Laing, 1933, New Caledonia.

Adult female almost entirely membranous, subcircular. Pygidium lacking the usual characteristics of the family but with seven projections, most of which have bifid processes resembling long gland spines but occasionally with three of these processes. Most of the major projections carry one or two microducts. Other microducts situated ventrally on the prepygidial segments. Anal ring noticeably large and situated towards apex. Anterior spiracles without pores.

Second stage female broadly ovoid. Pygidium with three definite pairs of lobes and a long triangular strip in place of the fourth lobe. Fringed plates present between the lobes. Tubular ducts short with inner end sclerotized and appearing one-barred although this condition not certain. Anal ring large, lying near apex. Ventral surface with sclerotized gland tubercles on thorax.

A pupillarial form, second stage female described as " subcircular, highly convex, warm reddish brown."

This genus comes close to *Greeniella* Cockerell in possessing peculiar projections in the adult female without any sign of lobes. The second stage female differs from that of *Greeniella* in possessing three definite pairs of lobes instead of two pairs.

DORIOPUS Brimblecombe

(Text-fig. 17)

[*Doriopus* Brimblecombe, 1959 : 397. *nom. nud.*]
Doriopus Brimblecombe, 1960 : 193.

Type species : *Doriopus bilobus* Brimblecombe, 1959, Australia.

This is a good genus containing a single distinctive species. It is pupillarial and the adult female is characterized by a single pair of prominent lobes set very close together. Margin of the pygidium with an almost continuous line of gland spines which become smaller anteriorly to fourth segment where they are replaced by gland tubercles. The dorsal ducts are absent except for one or two pairs of marginal microducts. The anterior spiracles have a few pores and the second pair of spiracles are set well forward and close to the anterior pair.

It is the second stage female which shows its Parlatoriine affinities in possessing marginal pygidial macroducts with the orifices surrounded by sclerotized rims and with the axes set transversely to the margin. There are also numerous sclerotized gland tubercles on the prepygidial segments. The median lobes are similar to those in the adult female.

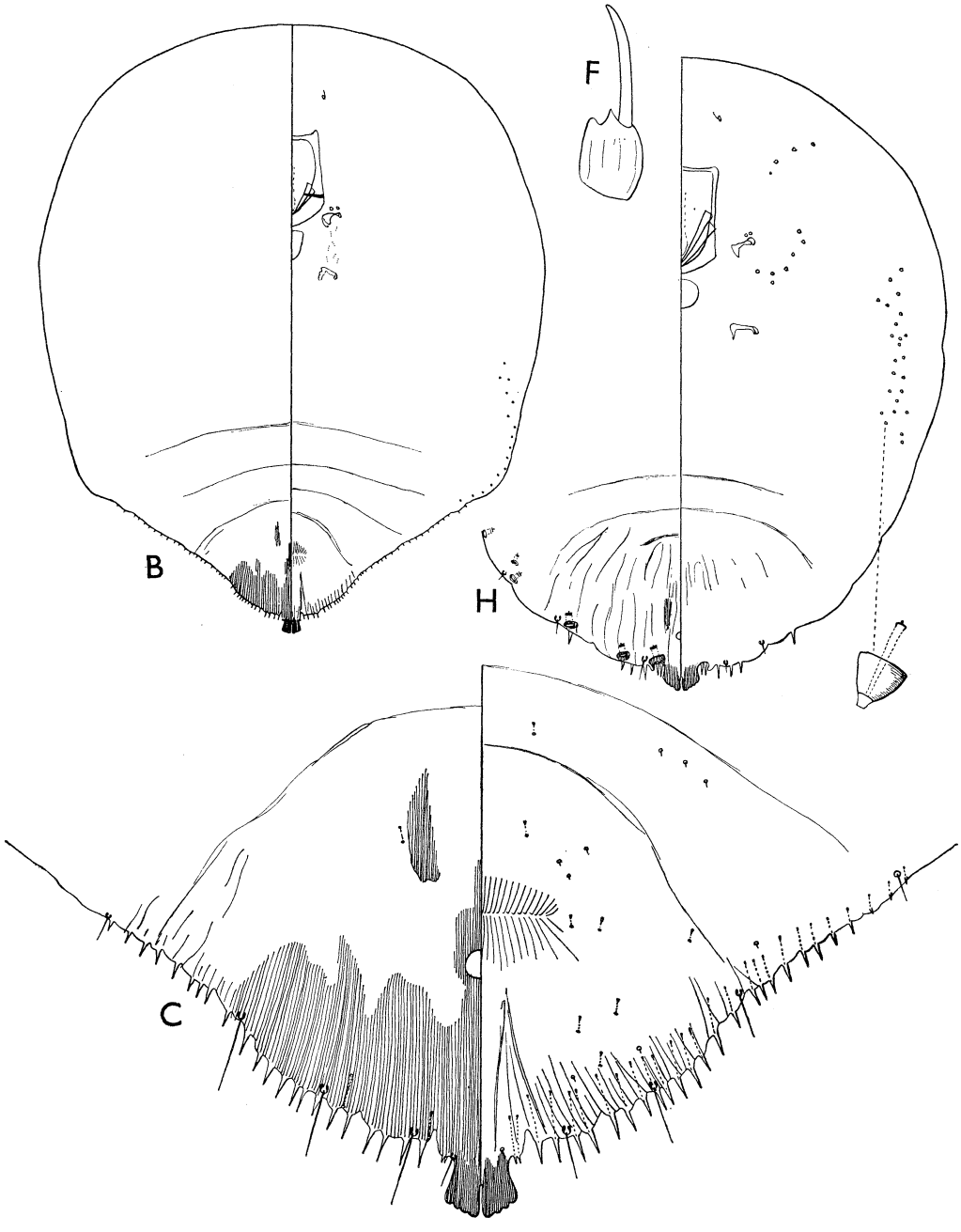

FIG. 17. *Doriopus bilobus* Brimblecombe. Paratype in the British Museum (Nat. Hist.), London. Paratype in the Department of Agriculture and Stock, Brisbane. Australia: Queensland, Gayndah, on *Acacia bidwilli*, x.1954 (*L. Pedley*).

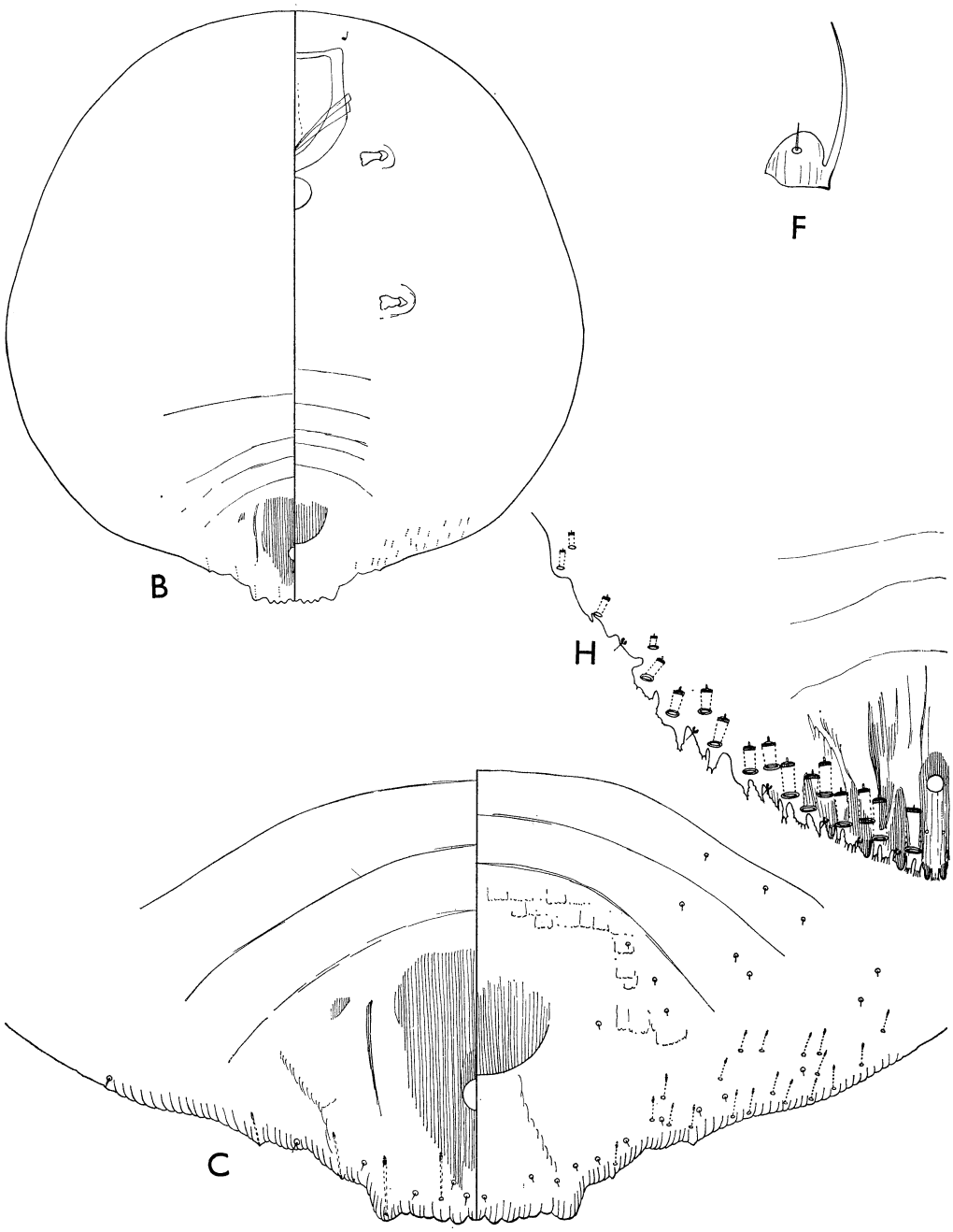

FIG. 18. *Eugreeniella pulchra* (Green). Type in the British Museum (Nat. Hist.), London. Australia: Victoria, Myrniong, on *Calistemon salignis*, (*J. Lidgett*) (No. 54).

With our incomplete knowledge of many of the pupillarial genera of the tribe Parlatoriini it is difficult to give the relationships of this genus.

EUGREENIELLA Brimblecombe

(Text-fig. 18)

Eugreeniella Brimblecombe, 1958 : 87.

Type species : *Aonidia* (*Greeniella*) *pulchra* Green, 1905*b*, Australia.

This is a distinct genus characterized by the adult female remaining within the exuviae of the second stage female. As with most pupillarial forms the adult female is membranous except for a small area on the pygidium. The distinguishing features of the genus are the short truncate pygidium devoid of any projections, the posterior edge crenulate ; dorsal ducts slender and confined to the margin.

The Parlatoriine affinities of the second stage female are shown by pygidium with four definite pairs of lobes and with fringed plates about as long as the lobes. The pygidial ducts are numerous around the margin, each with the orifice surrounded by a sclerotized rim and set with the axis transverse to the margin ; the inner end of each duct is sclerotized and most ducts show the two-barred condition but in others the second bar is difficult to determine.

This genus belongs to a group containing *Greeniella* Cockerell, *Gymnaspis* Newstead, *Porogymnaspis* Green and *Agrophaspis* gen. n. in possessing a similar type of second stage female, the nearest being *Agrophaspis*. A study of more species in these genera is needed.

LABIDASPIS gen. n.

(Text-fig. 19)

Type species : *Fiorinia myersi* Green, 1929, New Zealand.

Adult female enclosed within the exuviae of the second stage female. Shape broadly ovoid ; entire surface with a freckled appearance due to small thickenings of the derm. Pygidium without lobes or plates but the margin broadly crenulate, the crenulations at the apex projecting and sclerotized to appear as lobes. Dorsal ducts confined to a few on pygidium, small, but with orifice surrounded by a sclerotized rim. Perivulvar pores in five groups. Anterior spiracles with numerous pores. Gland tubercles present in a group opposite anterior spiracles.

Second stage female with median lobes projecting, the inner margins parallel, almost touching, the outer margins divergent. Second and third lobes represented by similar shaped projections. Plates and gland spines absent. Marginal ducts small, in the interlobular spaces ; orifices set transversely to the pygidial margin and each with sclerotized rim. Gland tubercles present around the margins.

The relationships to this genus are rather obscure but the second stage female comes nearest to that of *Doriopus* in possessing similar projecting median lobes and marginal ducts. Both genera probably belong to the same group although the adult females show some widely different characters.

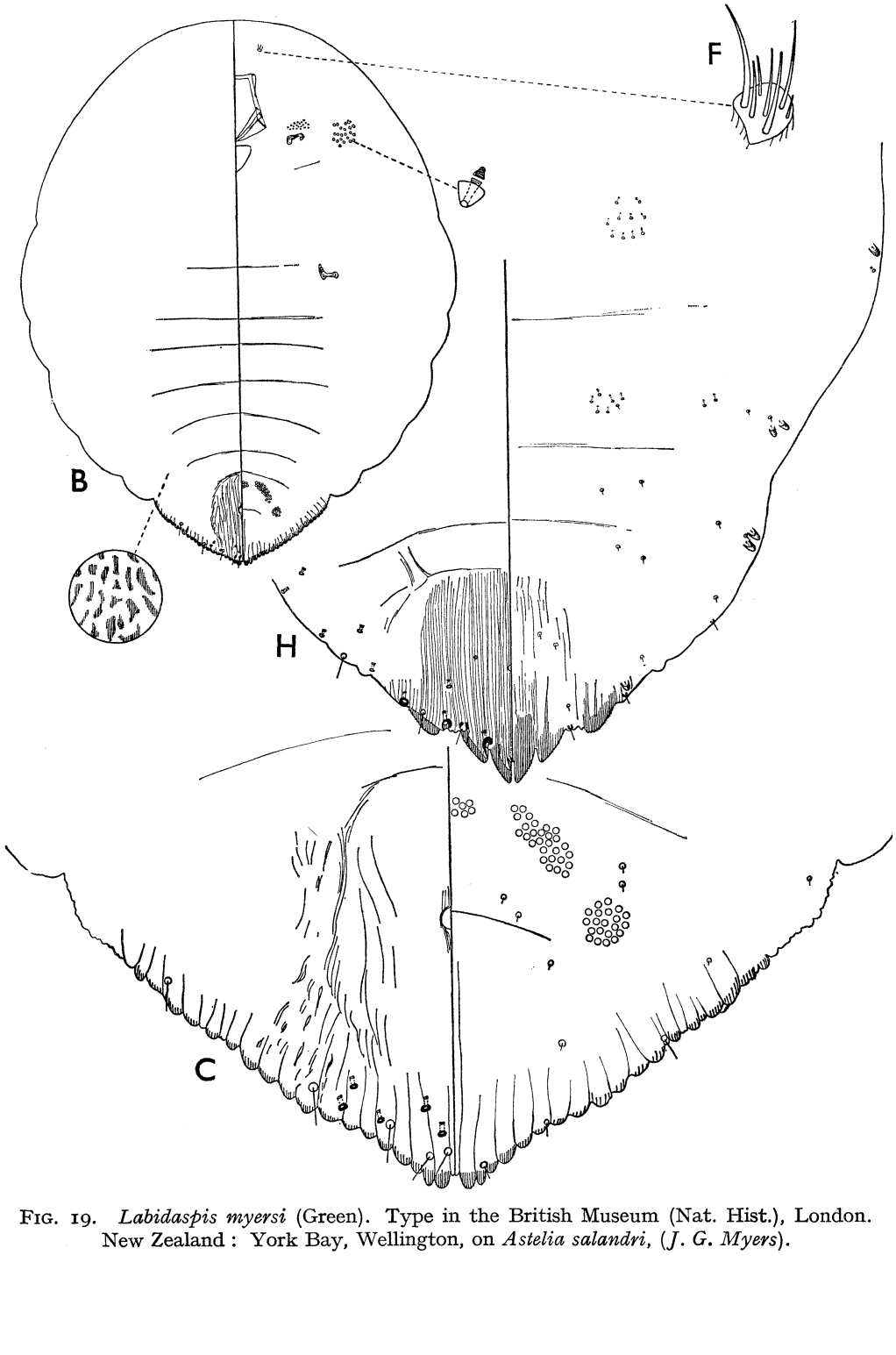

FIG. 19. *Labidaspis myersi* (Green). Type in the British Museum (Nat. Hist.), London. New Zealand : York Bay, Wellington, on *Astelia salandri*, (*J. G. Myers*).

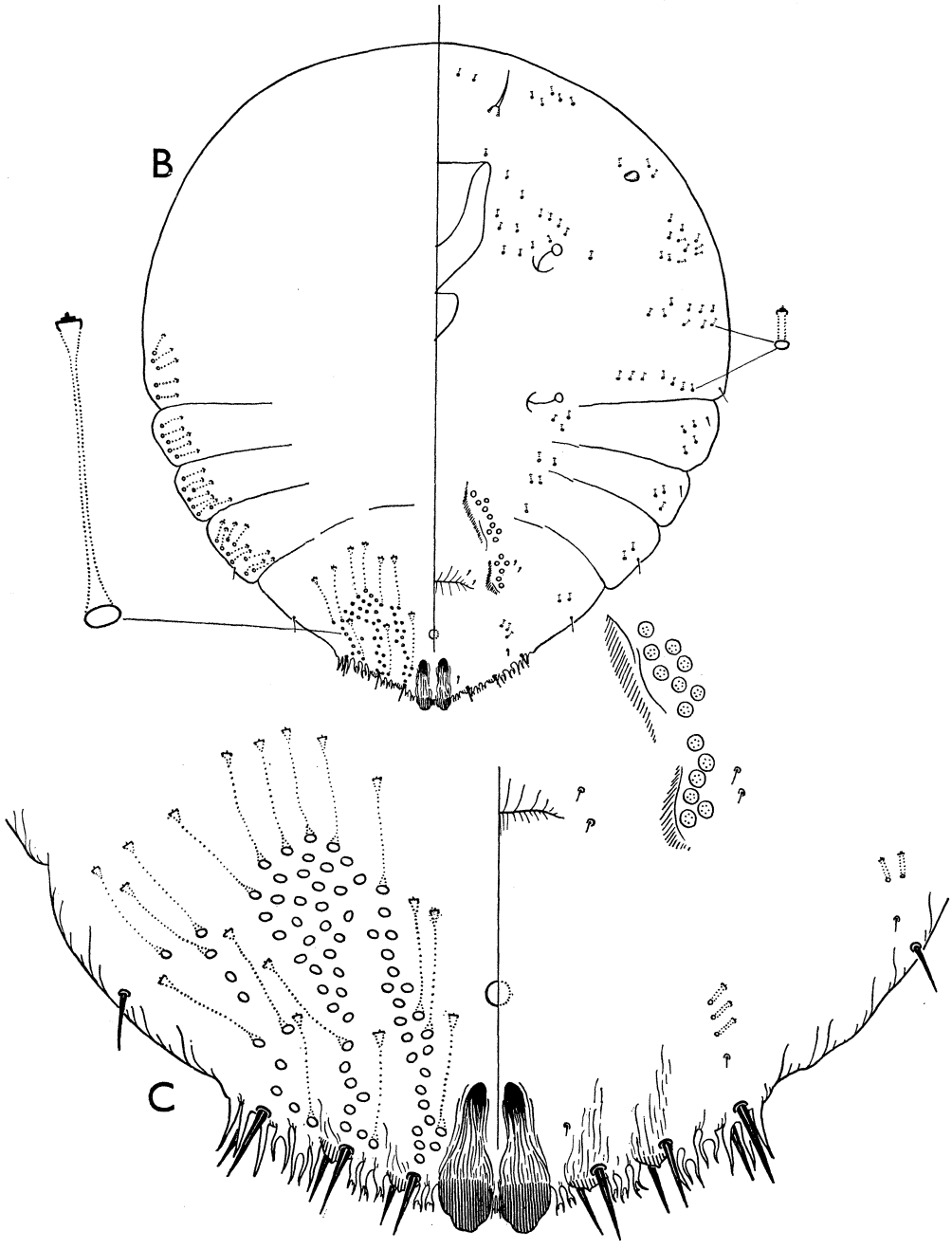

FIG. 20. *Acanthaspidiotus pustulans* (Green). Type in the British Museum (Nat. Hist.), London. Java: on the bark of *Erythrina lithosperma*, xi.1899 (*A. Zimmerman*).

GENERA OF THE TRIBE ASPIDIOTINI

ACANTHASPIDIOTUS gen. n.

(Text-fig. 20)

Type species : *Aspidiotus pustulans* Green, 1905, Java.

Body of adult female almost circular with pygidium pointed. Pygidium with three pairs of lobes ; median lobes very large, each with long basal scleroses, second and third lobes minute. Plates becoming longer anteriorly. Marginal setae very thick and spine-like. Dorsal ducts one-barred, slender and not long. Ventral surface with microducts. Perivulvar pores in four groups. Anterior and posterior spiracles without groups of pores. Paraphyses absent. Anal opening small and round, situated towards apex of pygidium.

Scale of adult female subcircular, brownish or fulvous with exuviae light brown, central.

This genus is close to the genera *Aspidiotus* Bouché and *Metaspidiotus* Takagi (1957) but differs from both in possessing slender ducts, large spine-like marginal setae and poorly developed second and third lobes. In possessing a small anal opening situated towards the apex of the pygidium the genus *Acanthaspidiotus* resembles *Monaonidiella* MacGillivray.

ANASPIDIOTUS gen. n.

(Text-fig. 21)

Type species : *Aspidiotus immaculatus* Green, 1904, Australia.

Body of adult female broadly oval. Pygidium rounded with three pairs of lobes, all well developed. Plates short, apically fringed, present only between the lobes. Dorsal ducts very large, one-barred, the inner end swollen and heavily sclerotized. Perivulvar pores and paraphyses absent. Spiracles without pores. Anal opening large and round, situated near centre of pygidium.

The large dorsal ducts with the swollen inner ends serve to distinguish the genus from *Aspidiotus* Bouché and related genera. It differs also from *Hemiberlesia* Cockerell in the position of the anal ring and the absence of paraphyses.

ARUNDASPIS Borchsenius

(Text-fig. 22)

Arundaspis Borchsenius, 1949 : 737.
Arundaspis Borchsenius ; Borchsenius, 1950 : 211.
Arundaspis Borchsenius ; Balachowsky, 1951 : 92.
Arundaspis Borchsenius ; Balachowsky, 1953 : 5.
Arundaspis Borchsenius ; Balachowsky, 1958 : 298.

Type species : *Arundaspis secreta* Borchsenius, 1949, Tadzhikistan.

The genus *Arundaspis* is considered to be a good one although it was regarded as being identical with *Rhizaspidiotus* by Balachowsky (1951). At the present time only one highly specialized species is known from Central Asia. It is allied to the genera *Aspidiella* Leonardi, *Rhizaspidiotus*, *Remotaspidiotus* MacGillivray and *Eremiaspis*

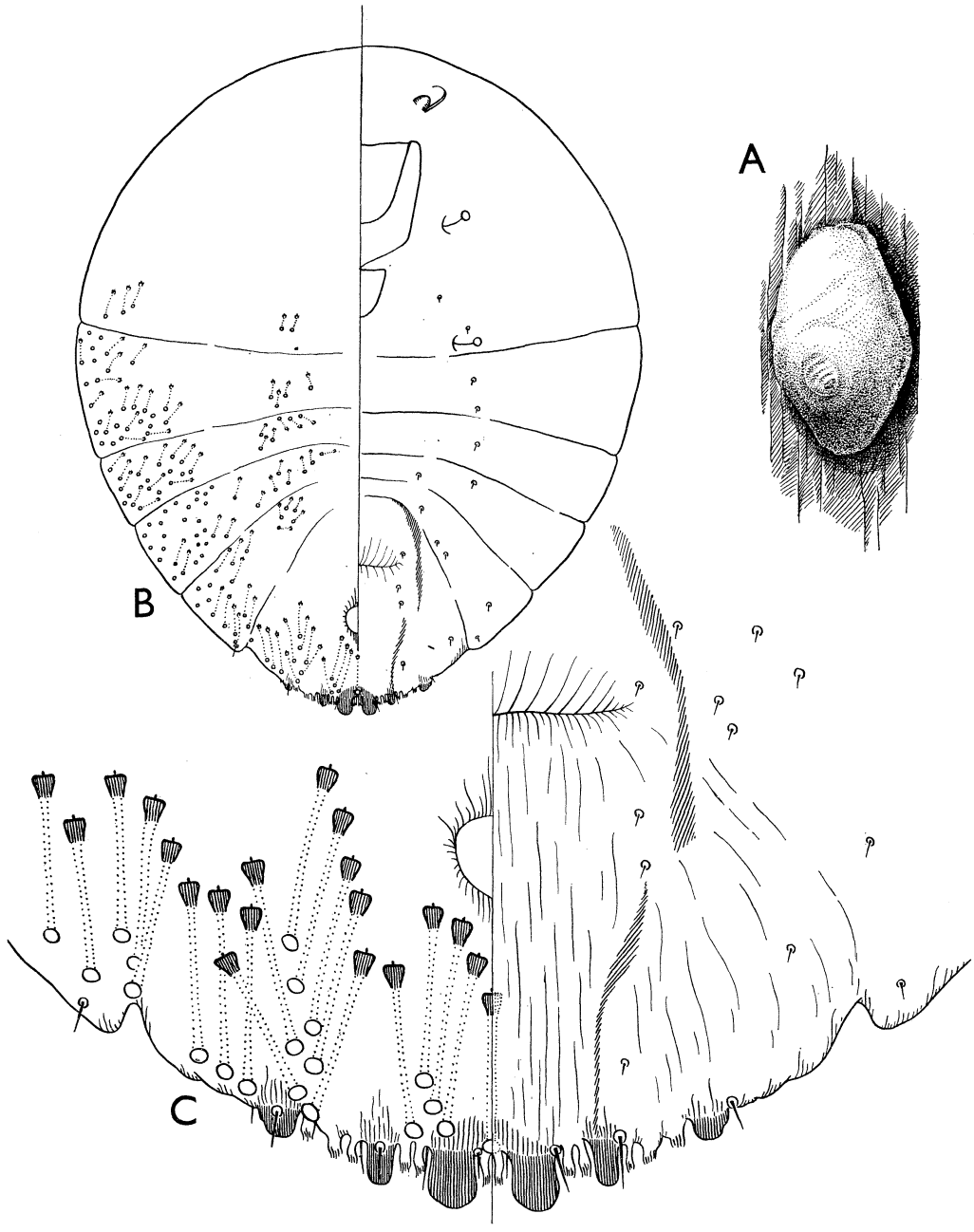

FIG. 21. *Anaspidiotus immaculatus* (Green). Type in the British Museum (Nat. Hist.), London. Australia : Victoria, Shepperton, on stems of *Styphelia virgata*, (*C. French*).

Balachowsky. All of these genera probably form one genetic branch with *Arundaspis* lying somewhat apart. The females of *Arundaspis* differ from those of the allied genera in possessing dorsal ducts with the orifices surrounded by sclerotized rims and in the median lobes being set wide apart. The median lobes of *Arundaspis*

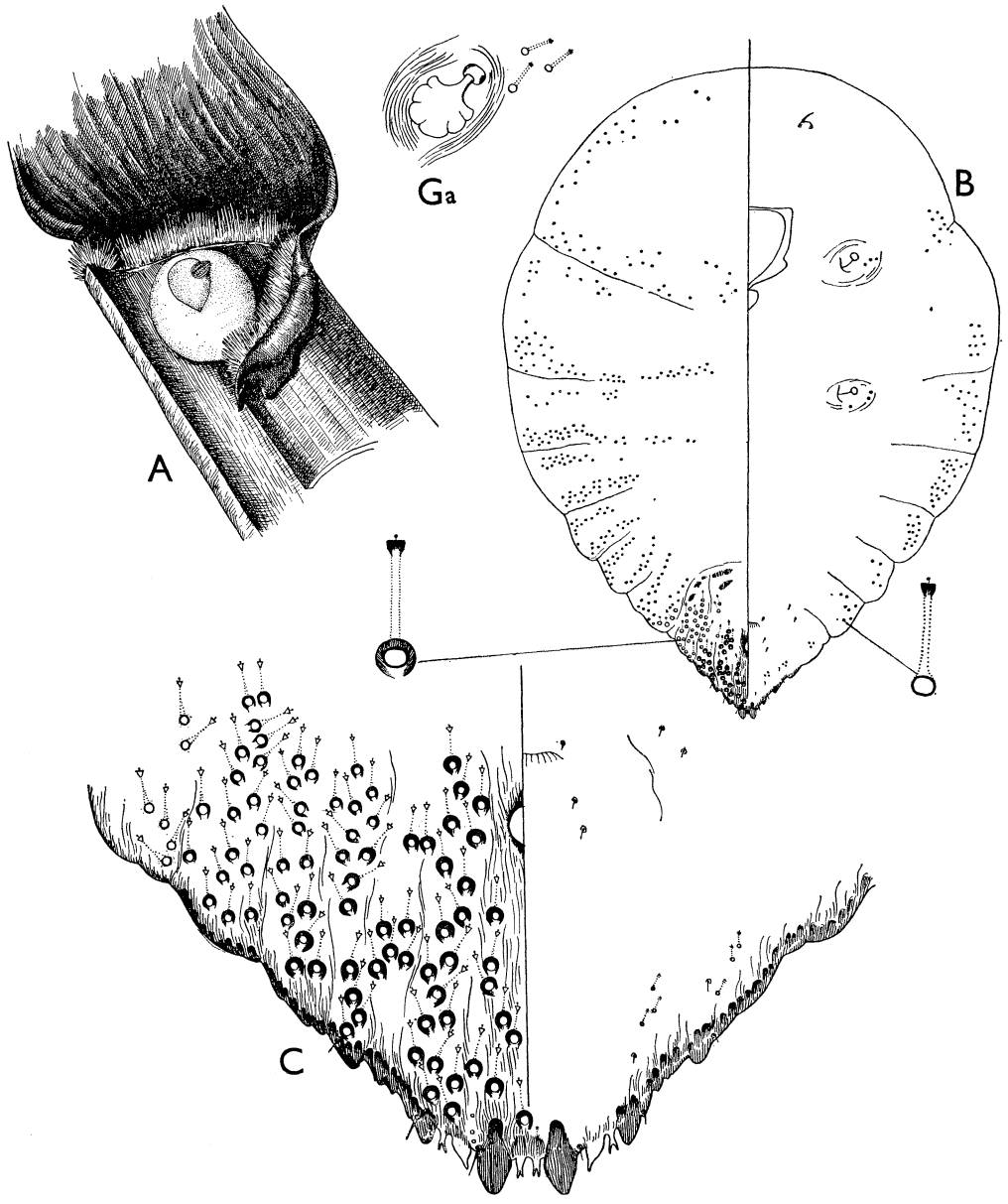

FIG. 22. *Arundaspis secreta* Borchsenius. Holotype in the Zoological Institute of Academy of Sciences of the U.S.S.R., Leningrad. U.S.S.R.: Tadzhikistan, on leaves of *Arundo donax*, 14.vi.1944 (*N. S. Borchsenius*).

and *Aspidiella* are well developed but in the other genera they are often poorly developed but if they show any signs of development then they are close together.

ASPIDIOIDES MacGillivray

(Text-fig. 23)

Aspidioides MacGillivray, 1921 : 387.
Aspidioides MacGillivray ; Ferris, 1937 : 51.

Type species : *Aspidiotus corokiae* Maskell, 1891, New Zealand.

The genus *Aspidioides* is regarded as distinct until such time as the species from New Zealand and Australia have been studied further. Its distinctive features are the three pairs of lobes, the median lobes with well developed basal scleroses ; plates fringed ; dorsal pygidial ducts small and very slender ; ventral surface with a few microducts only ; perivulvar pores represented by one or two in the anterior lateral groups only. The nearest genus is apparently *Monaonidiella* MacGillivray, also with short slender ducts but this genus lacks the second and third lobes except for non-sclerotized projections and possesses pointed plates. Although bearing a superficial resemblance to *Aspidiella* Leonardi, the genus *Aspidioides* lacks ventral pygidial ducts. The plates are similar to those in *Aspidiotus* but this genus possesses much wider lobes.

EULAINGIA Brimblecombe

(Text-fig. 24)

Eulaingia Brimblecombe, 1958 : 80.

Type species : *Pseudaonidia stenophyllae* Laing, 1929, Australia.

This is a distinct genus recently erected. With the constriction between the prothorax and mesothorax it belongs to the *Pseudaonidia-Duplaspidiotus* series. It shares with *Duplaspidiotus* MacGillivray the clavate paraphyses but differs in possessing only two pairs of lobes instead of three, the second pair being minute and very close to the median pair. Other distinguishing characters are the poorly developed plates and dorsal reticulation in the centre of the pygidium.

GOMPHASPIDIOTUS gen. n.

(Text-fig. 25)

Type species : *Aspidiotus cuculus* Green, 1905*a*, Ceylon.

Adult female broadly ovate with a small constriction between prothorax and mesothorax, body sclerotized at maturity. Pygidium tending to be pointed, with an area of faint reticulation on each of the dorsal and ventral surfaces. Margin of pygidium crenulate, heavily sclerotized but without definite paraphyses. Lobes represented by a median pair only, well developed and very close together. Plates about as long as lobes and very slender, almost seta-like but with blunt apices. Dorsal ducts numerous, very slender ; ventral ducts smaller and numerous. Anal opening minute. Anterior spiracles with a few pores.

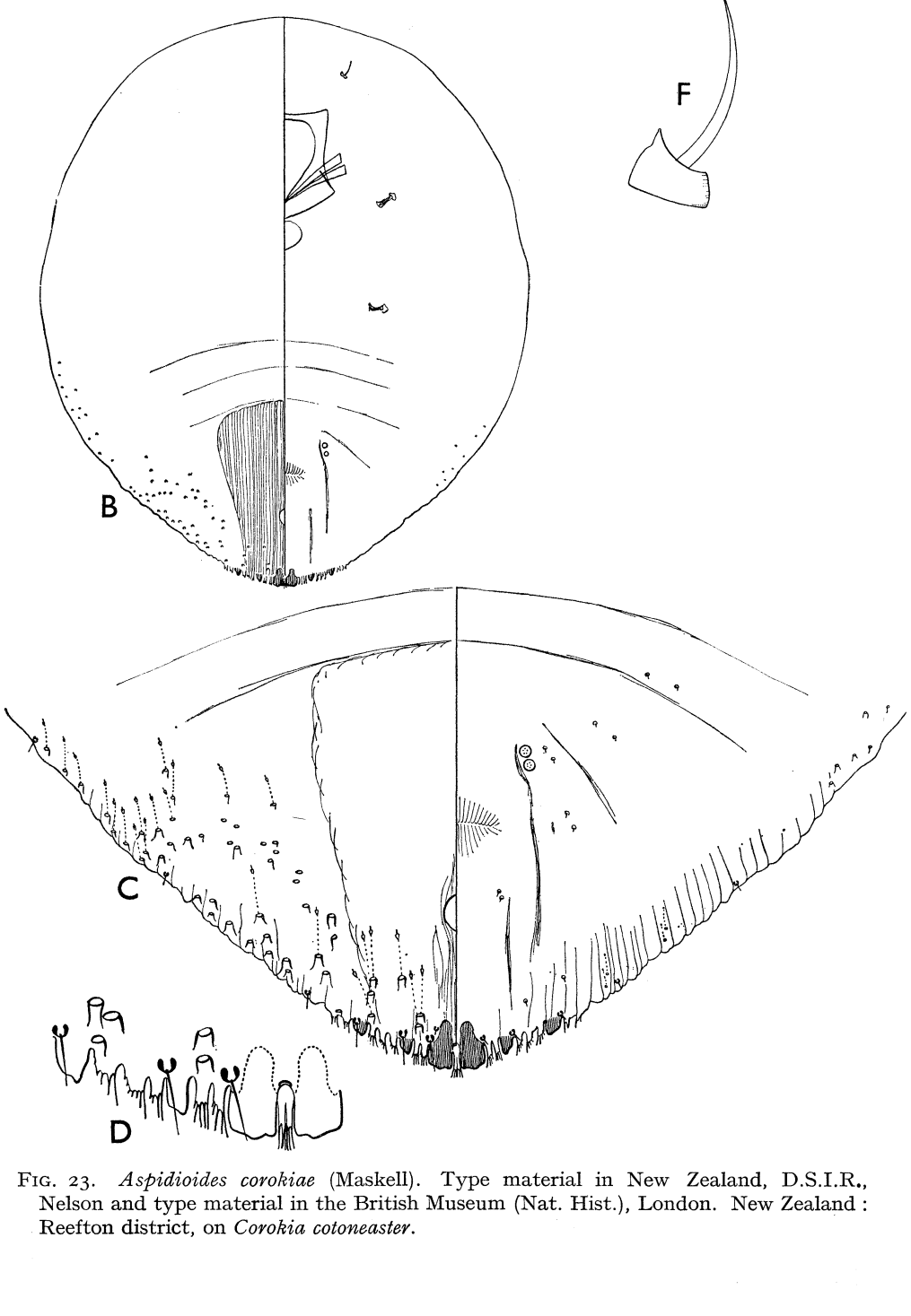

FIG. 23. *Aspidioides corokiae* (Maskell). Type material in New Zealand, D.S.I.R., Nelson and type material in the British Museum (Nat. Hist.), London. New Zealand : Reefton district, on *Corokia cotoneaster*.

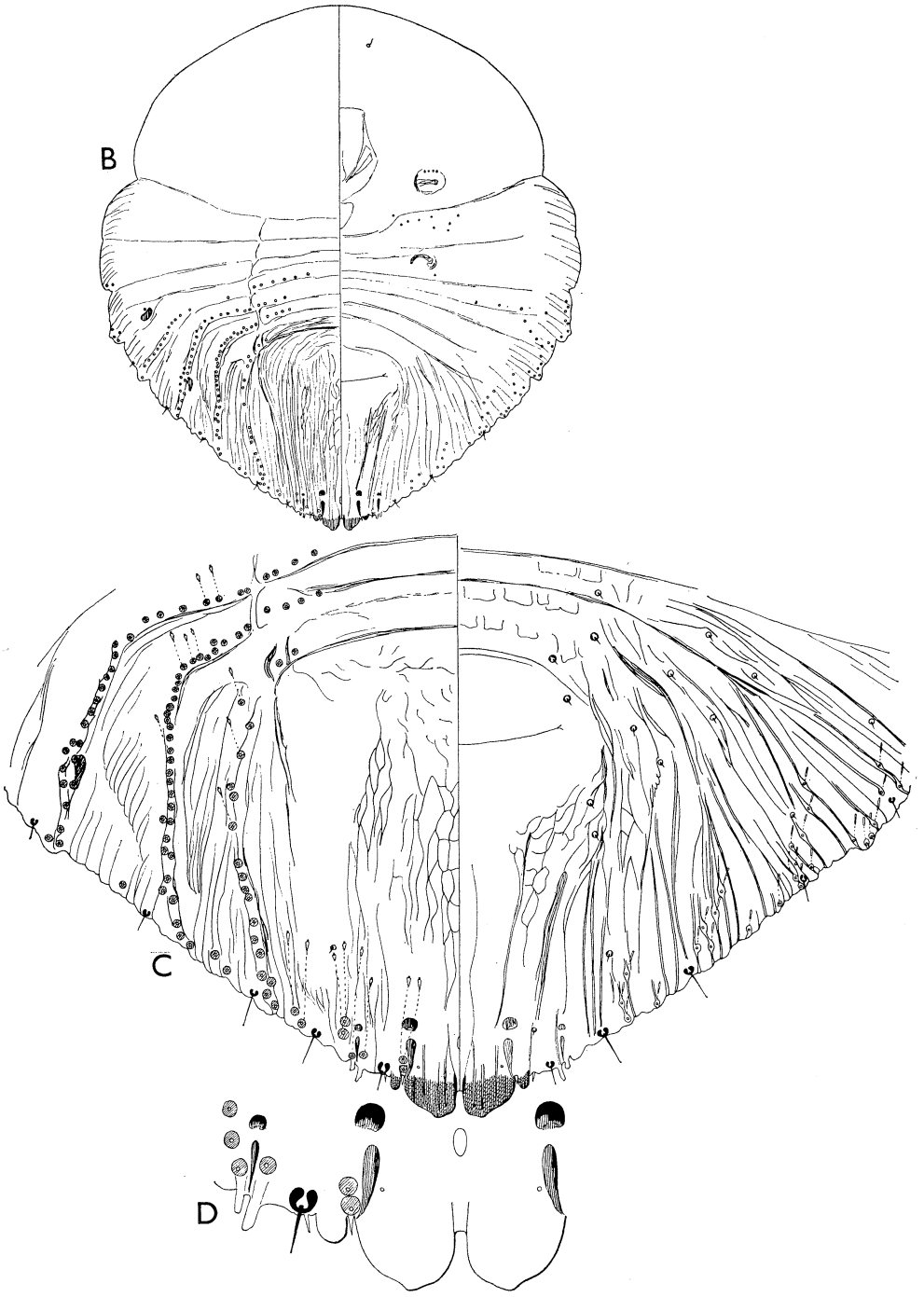

FIG. 24. *Eulaingia stenophyllae* (Laing). Holotype in the British Museum (Nat. Hist.), London. Australia: Victoria, Murray River, nr. Hattah, on *Acacia stenophylla*, (*J. E. Dixon*).

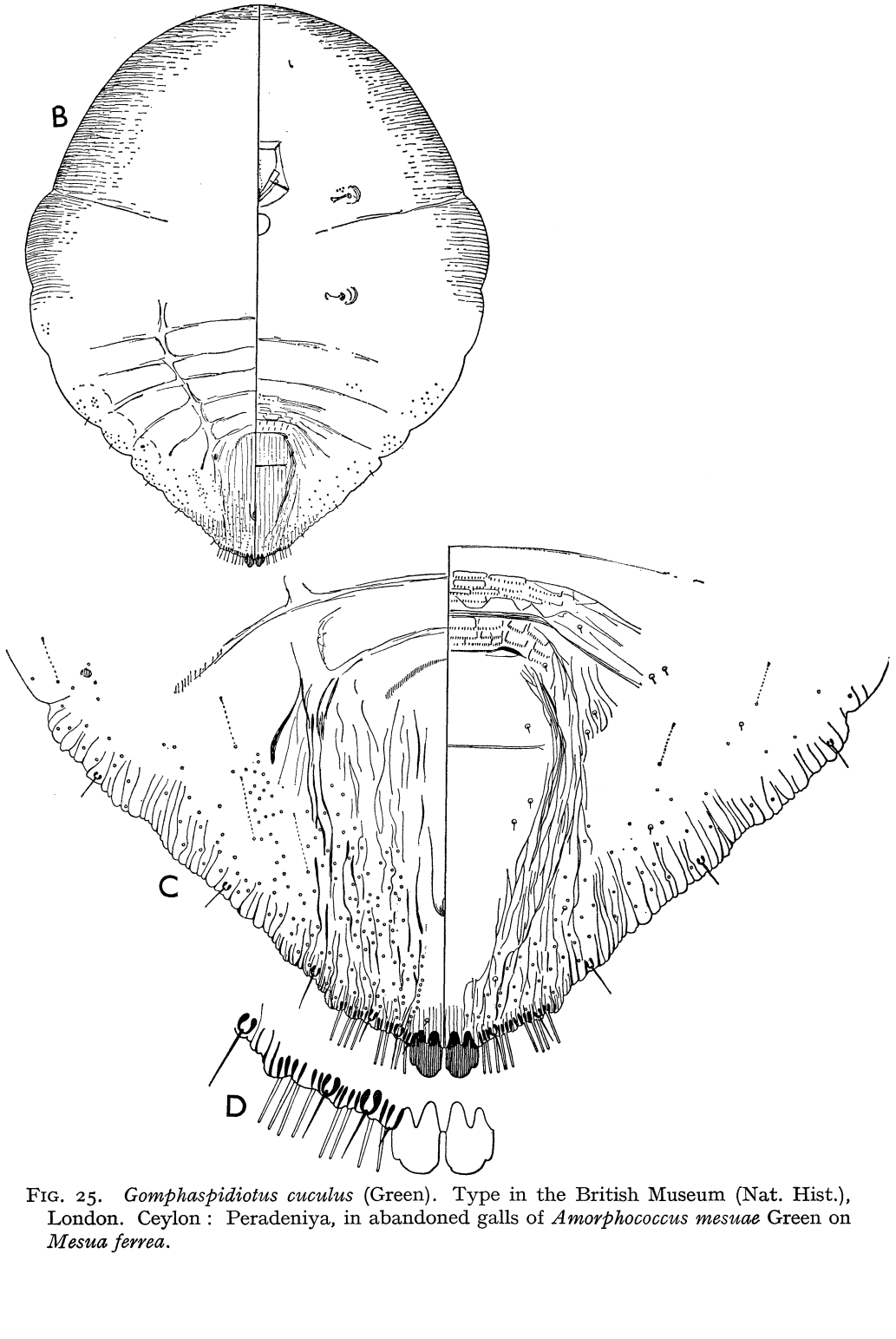

FIG. 25. *Gomphaspidiotus cuculus* (Green). Type in the British Museum (Nat. Hist.), London. Ceylon : Peradeniya, in abandoned galls of *Amorphococcus mesuae* Green on *Mesua ferrea*.

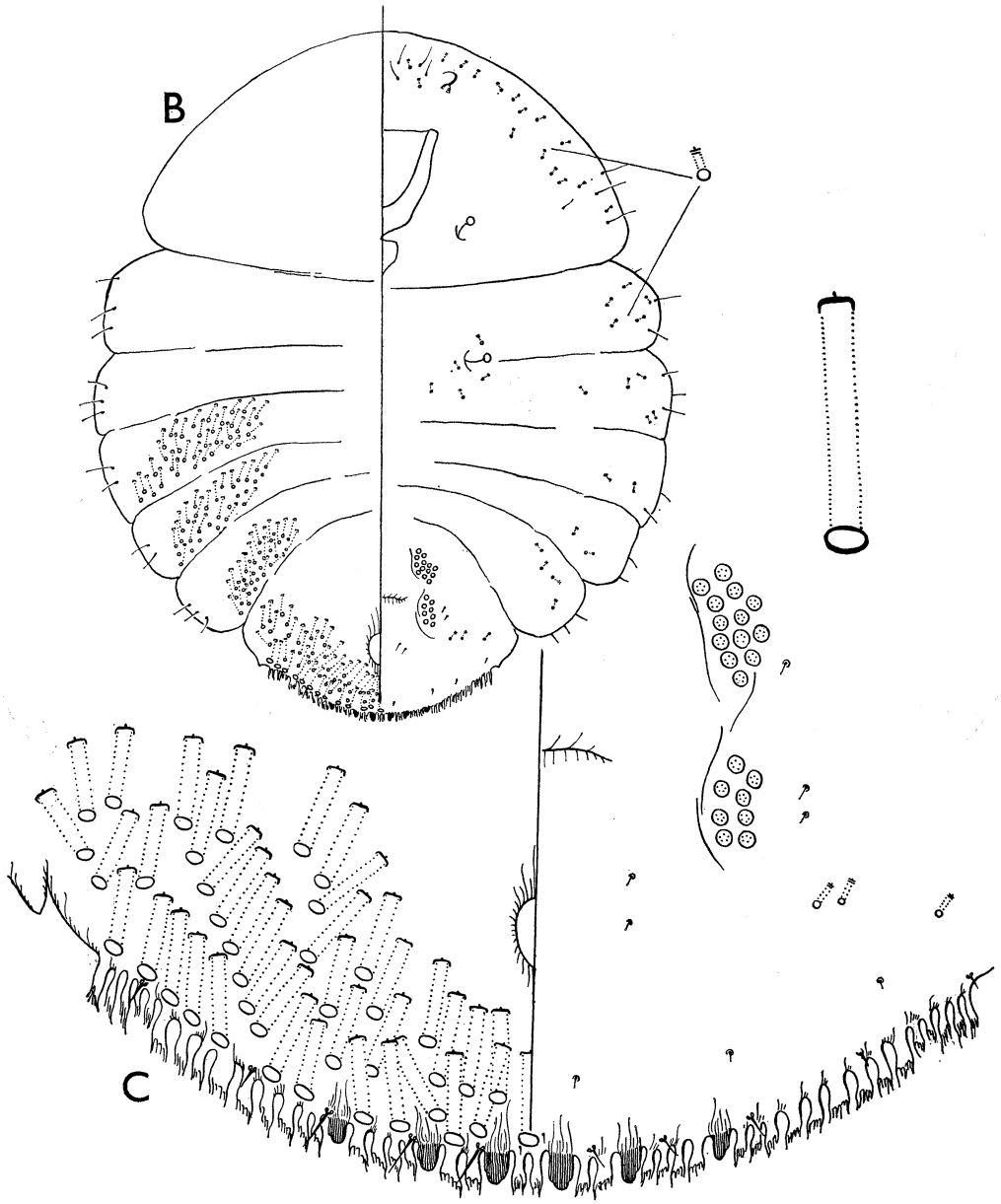

FIG. 26. *Megaspidiotus fimbriatus* (Maskell). Type material in the British Museum (Nat. Hist.), London. Australia : on *Eugenia* sp. and Australia : East Gippsland, Pescott, on leaves of *Eugenia smithii*, (*G. French*).

Scale of adult female dull brown, irregular in form due to the crowded position inside galls and inquiline habit.

With the sclerotized body at maturity and the constriction between the prothorax and mesothorax this genus belongs to the *Pseudaonidia* group. In possessing only a single pair of lobes it comes closest to the genus *Neomorgania* MacGillivray, *Diastolaspis* Brimblecombe and *Dichosoma* Brimblecombe. All of these genera possess paraphyses and the last two have fringed plates which are absent in the new genus.

MEGASPIDIOTUS Brimblecombe

(Text-fig. 26)

Megaspidiotus Brimblecombe, 1954 : 155.

Type species : *Diaspis fimbriata* Maskell, 1893, Australia.

The genus *Megaspidiotus* is a distinct one belonging to the group of genera allied to *Aspidiotus* Bouché. It differs from these genera in possessing a constriction between the prothorax and mesothorax, a character shared with the *Pseudaonidia* group but there are also constrictions on all the prepygidial segments. The three pairs of well developed lobes, the structure of the plates, the absence of stigmatic pores and the absence of an area of reticulation on the pygidium link this genus with *Aspidiotus* rather than *Pseudaonidia*.

PSEUDOMELANASPIS Borchsenius

(Text-fig. 27)

Pseudomelanaspis Borchsenius, 1952 : 262.
Pseudomelanaspis Borchsenius ; Balachowsky, 1958 : 191.

Type species : *Pseudomelanaspis minima* Borchsenius, 1952, Iran.

The genus *Pseudomelanaspis* is distinct and allied to *Melanaspis* Cockerell. It differs in having the lobes set well apart, the axes in a fan-like arrangement ; in possessing fewer paraphyses and shorter tubular ducts. Within these limits, one species is included from South Iran, outside the known distribution of *Melanaspis*.

REMOTASPIDIOTUS MacGillivray

(Text-fig. 28)

Remotaspidiotus MacGillivray, 1921 : 391.
Rhizaspidiotus MacGillivray ; Ferris, 1937 : 34.
Rhizaspidiotus MacGillivray ; Ferris, 1943 : 99.
Remotaspidiotus MacGillivray ; Brimblecombe, 1958 : 74.

Type species : *Aspidiotus* (*Targionia*) *chenopodii* Marlatt, 1908, Australia.

This genus was regarded by Ferris (1937) as being identical with *Rhizaspidiotus* MacGillivray but was resurrected by Brimblecombe (1958). Although based on

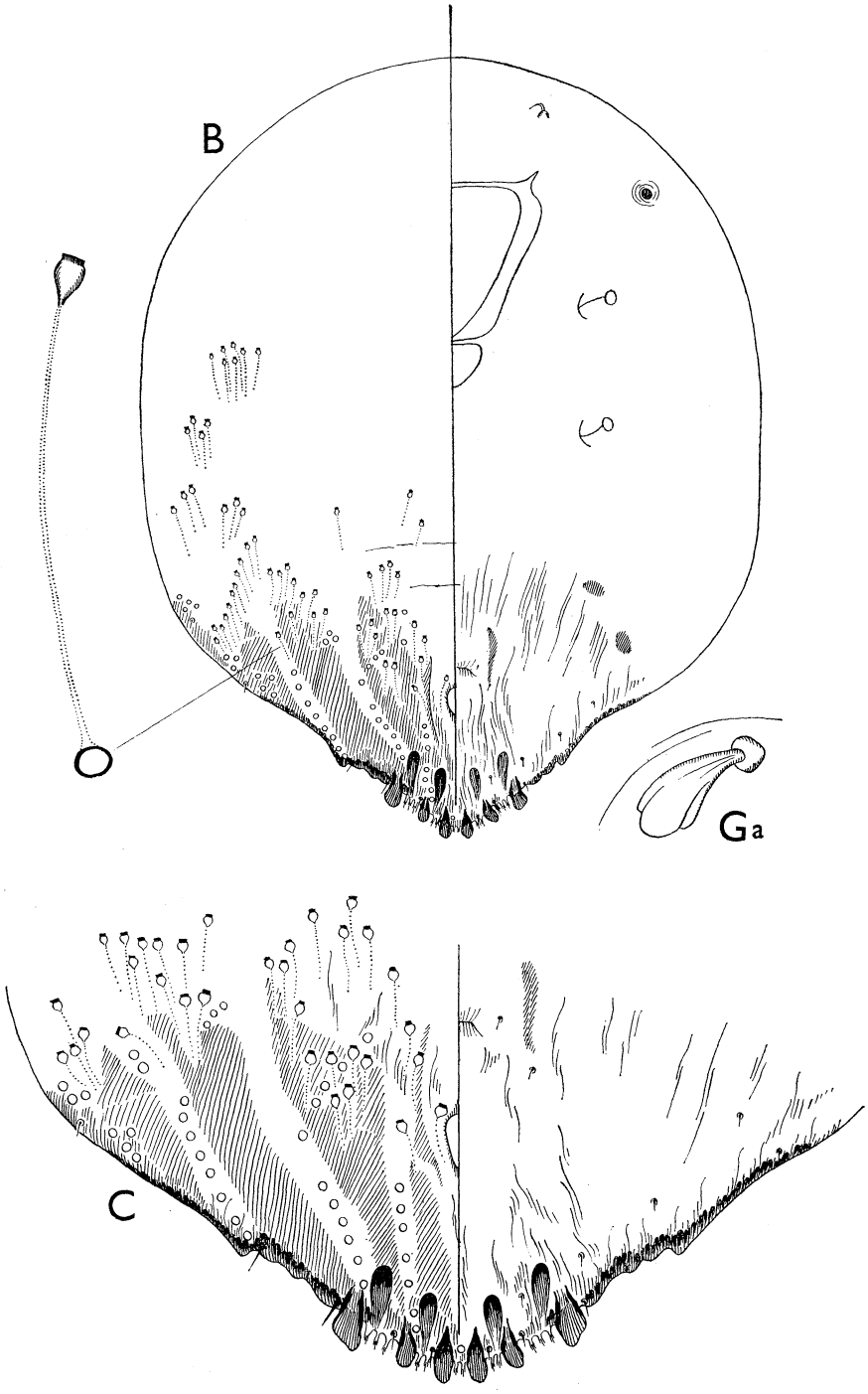

FIG. 27. *Pseudomelanaspis minima* Borchsenius. Holotype in the Zoological Institute of Academy of Sciences of the U.S.S.R., Leningrad. South Iran : Bandar Abbas, on stems of *Anabasis aphylla*, xi.1947 (*G. Kiriukhin*).

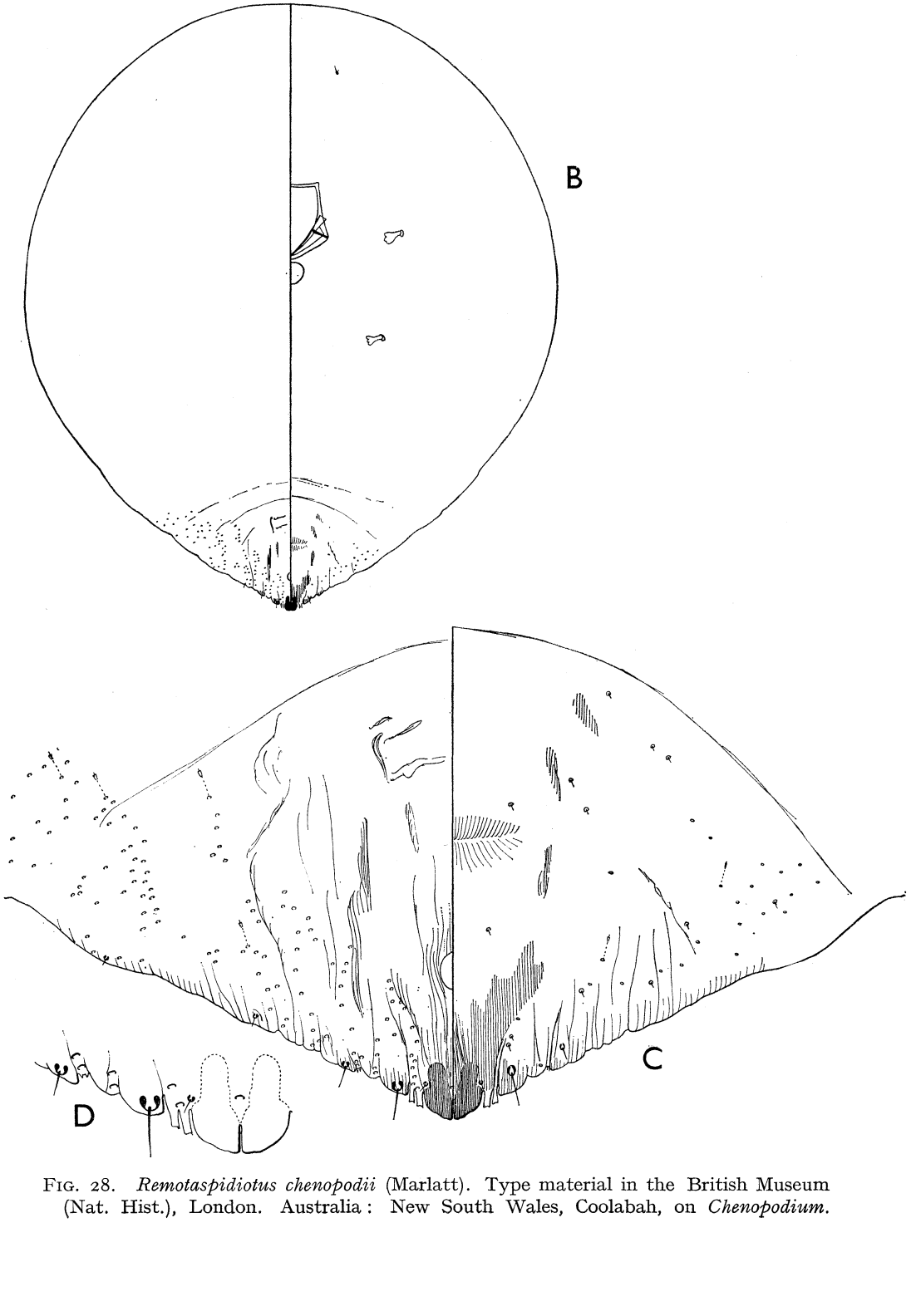

FIG. 28. *Remotaspidiotus chenopodii* (Marlatt). Type material in the British Museum (Nat. Hist.), London. Australia: New South Wales, Coolabah, on *Chenopodium*.

type material, the illustration differs slightly from the description given by Marlatt (1908) and by Brimblecombe (1958) in possessing well developed plates only in the first interlobal spaces but this may be due to the state of the specimens available. The genus comes extremely close to *Rhizaspidiotus* but now that other related Australian species have been studied there appears to be a definite group in Australia worthy of generic rank. In all the known species of *Rhizaspidiotus* the pygidial margin is deeply crenulate and the second and third lobes show some development in being somewhat sclerotized. In *Remotaspidiotus* these lobes are not apparent and if there is any sign of a swelling in the position of a second or third lobe then it is entirely membranous. The true picture will become clear when more Australian species are studied in detail.

DESCRIPTION OF FIGURES

The lettering used in the figures is as follows : A. Habit. B. Adult female, general aspect. C. Pygidium. D. Dorsal margin of pygidium. E. Ventral margin of pygidium. F. Antenna. Ga. Anterior spiracle. Gb. Posterior spiracle. H. Pygidium of second stage female.

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