Recent Research in Neuropterology. – Gepp J., H. Aspöck & H. Hölzel ed., 1986, Graz.

Biogeography of Palearctic Myrmeleonidae (Neuropteroidea: Planipennia)

By Herbert HÖLZEL, Sattendorf

ABSTRACT

In the Palearctic region we know at present about 300 species of ant-lions. Most of them are restricted to the dry areas in North Africa and the Near East. Distribution patterns of this large fauna are outlined and discussed.

1. INTRODUCTION

The Myrmeleonidae represent the largest family of Planipennia, about 2.000 species have been described throughout the world. Ant-lions are mainly found in arid and semiarid regions; the majority of the 300 species we know at present in the Palearctic are from such habitats. The main distribution centres of palearctic ant-lions are: the large Mediterranean centre - here we find almost all European ant-lions, the Afroeremian, the Syroeremian, the Iranoeremian, the Turanoeremian, the Mongolian and Chinese, the Nepalese and in the Far East the Manchurian centre (Map 1)..

2. REVIEW OF CLASSIFICATION

In spite of the large and striking insects that are found in this family, only few workers have hitherto dealt with this group of Planipennia. So, the supra-generic classification of the family is still rather unsatisfactory.
The earliest classifications were made by BANKS (1911, 1927) and ESBEN-PETERSEN (1918). BANKS (1911) recognized 2 subfamilies: Myrmeleoninae and Dendroleoninae; later on (BANKS 1927) he added two more: Palparinae and Macronemurinae. This classification was used by RIEK (1970) on the Australian Myrmeleonidae. ESBEN-PETERSEN (1918) split the family into 2 groups: Archaemyrmeleonida and Neomyrmeleonida - terms that are not covered by the rules of zoological nomenclature. The Archaemyrmelonida contained Palpares and related forms and were considered to be the more primitive ant-lions. This view is generally supported by other authors (e. g. HÖLZEL 1972). MARKL (1954) classified all genera of the world into 23 tribes but did not attempt to divide the family into subfamilies; his classification has not been fully accepted (e. g. HÖLZEL 1972). STANGE (1961) listed 3 subfamilies from the New World: Dendroleoninae, Acanthaclisinae and Macronemurinae. In later papers (STANGE 1970, 1976) he finally recognized 3 subfamilies: Palparinae, Myrmeleoninae and Acanthaclisinae. HÖLZEL (1972) divided the family into 3 subfamilies: Palparinae, Echthromyrmicinae and Myrmeleoninae. ASPÖCK, ASPÖCK,

HÖLZEL (1980) recognized only 2 subfamilies: Palparinae (including Echthromyrmex) and Myrmeleoninae. NEW (1982) added a new subfamily Stilbopteryginae from Australia and recognizes in his new paper on the Australian Myrmeleontidae (1985) 3 subfamilies in Australia: Myrmeleoninae, Acanthaclisinae and Stilbopteryginae.

The division into 2 subfamilies Palparinae and Myrmeleoninae (ASPÖCK, ASPÖCK, HÖLZEL 1980) is based on characters of the wing venation. In the forewings of Palparinae a strong posterior cubital vein with mostly 3 stems runs to the wing margin (plesiomorphic). In Myrmeleoninae this is reduced to a very short vein that merges in the first anal vein near the wing basis (apomorphic). In the hindwings of Myrmeleoninae there are only two anal veins, whereas in the Palparinae 3 complete anals are present. Palparinae seem to be founded only on plesiomorphic characters, but most probably a closer examination of larvae will reveal more promising features. MANSELL (1985) considers an increased number of larval teeth apomorphic relative to other groups (in Palparinae larval tooth number varies between 3 and 6).

3. DISTRIBUTION OF PALEARCTIC MYRMELEONIDAE

The PALPARINAE are restricted to Africa, the Mediterranean region and large parts of western Asia, south of the Himalayan Mountains. The subfamily comprises about 100 species which can be grouped in 4 tribes (sensu MARKL): Palparini, Palparidiini, Echthromyrmicini and Pseudimarini.

The MYRMELEONINAE (sensu ASPÖCK, ASPÖCK, HÖLZEL 1980) are represented in the Palearctic with 7 tribes: Dendroleonini (worldwide, centre in southern hemisphere), Distoleonini (Old World), Glenurini (worldwide, centre in southern hemisphere), Acanthaclisini (worldwide), Isoleonini (Southern Europe, Africa, Asia), Myrmecaelurini (Southern Europe, Africa, Asia), Myrmeleonini (worldwide).

3.1. PALPARINI (Map 2): The centre of distribution is undoubtedly in the southern hemisphere, from Africa about 60 species in 10 genera are described; only a few (10) species are known from the Oriental region. In the Palearctic we find 5 species of the genus **Palpares** in North Africa and 1 in southern Europe; the largest number is found in the Arabian Peninsula (8), 6 belong to **Palpares**, 1 to **Stenares** and 1 to **Tomatarella** (probably indigenous).

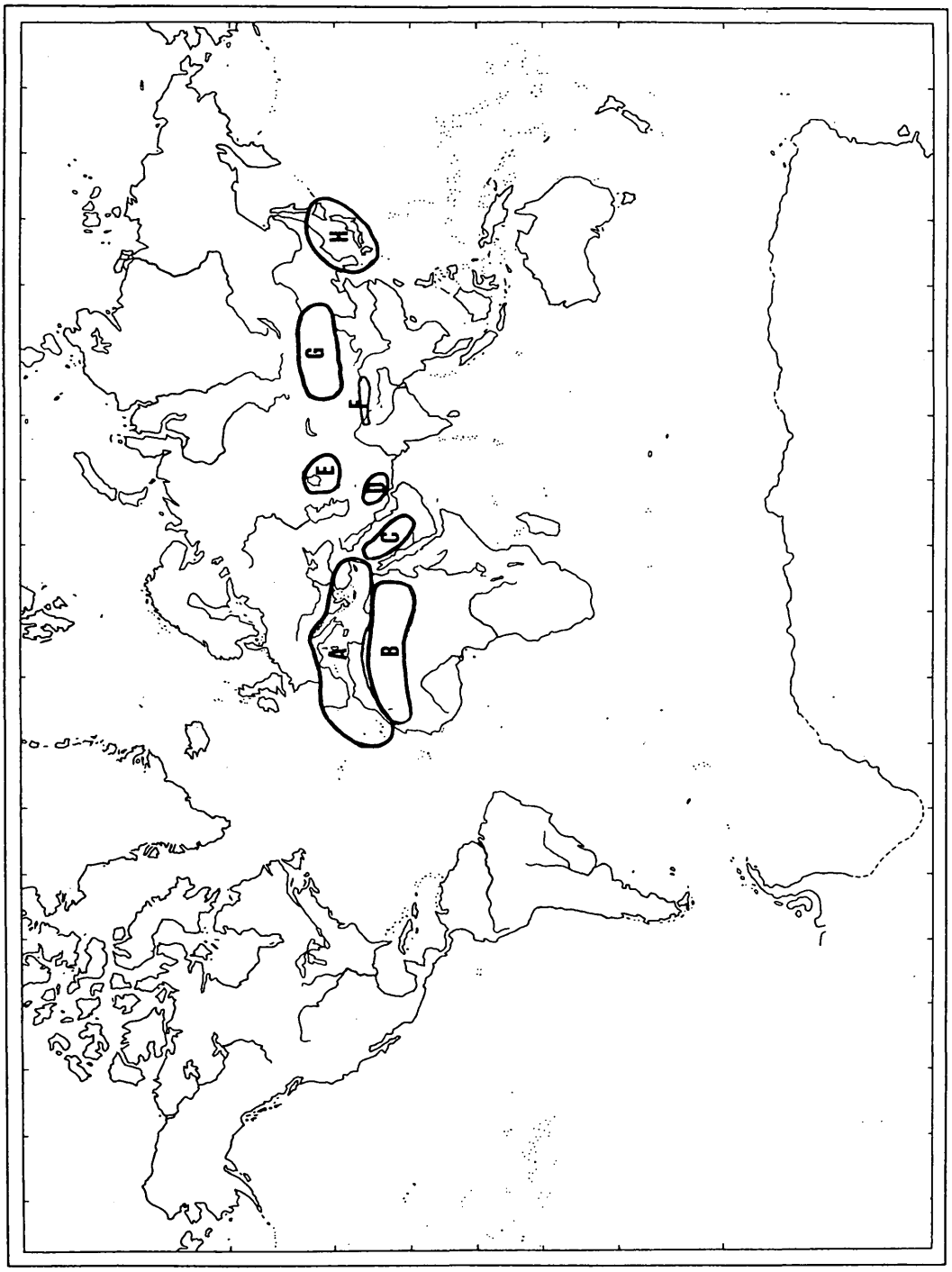
3.2. The **PSEUDIMARINI** contain only 1 genus and species **Pseudimares iris**, a rather peculiar insect that has been collected in Iran, so far only once and represented only in the collections of the British Museum.

3.3. The **ECHTHROMYRMICINI** are also a small tribe with 1 genus and 3 species: **E. platypterus** from Iraq and Afghanistan, **E. orientalis** in Burma and **E. insularis** in Socotra.

3.4. The **PALPARIDIINI** (genus **Palparidius** with 2 species) are restricted to South Africa.

3.5. The centre of distribution of **DENDROLEONINI** (Map 3) seems to be in South America and Australia. Only few species are living in the Palearctic. At present 6 genera are recognized, 5 of them with strict palearctic distribution: **Epacanthaclisis** with 1 species in Japan and 1 in Central Asia, **Afghanoleon** with 1 species in Afghanistan, **Gatzara, Borbon** and **Layahima**, each with 1 species, in the Himalayan Mountains. A rather peculiar distribution pattern show the species of **Dendroleon:** 1 in North America, 1 in Europe, 4 in Asia and 4 in Australia.

3.6. The largest group of ant-lions represent the **DISTOLEONINI**, dispersed over the Old World and containing about 60 genera. In the Palearctic about one half of all ant-lions belong to this tribe (about 150 species). They are classified in 15 genera, 9 of them being strictly palearctic. Map 4 covers the distribution of 8 of them, containing about 30 species: **Nicarinus** (Pontomediterranean), **Quinemurus** and **Graonus** (Arabian), **Barreja** (Iranian), **Geyria** and **Ganguilus** (Saharoiranian), **Delfimeus** and **Mesonemurus** (Saharomongolian). The 2 species of genus **Deutoleon** (Map 5) are probably elements of the Manchurian (or



Map 1: Main distribution centres of palearctic Myrmeleonidae: A) Mediterranean, B) Afroeremian, C) Syroeremian, D) Iranoeremian, E) Turanoeremian, F) Nepalese, G) Mongolian, H) Manchurian.

Mongolian) distribution centre and show a distinct Eurosiberian distribution pattern. **Macronemurus** (Map 6) contains about 40 species, dispersed all over Africa, southern Europe and the Near East.
(The genera **Uroleon**, described from the Canary Islands and **Nemurius** from Morocco are included.)

Nearly 100 species of **Distoleon** (Map 7) have been described; they are distributed all over the Old World from the Canaries and Madeira in the west to Australia and Micronesia in the east. The largest and taxonomically most complicated group is to be found in **Neuroleon.** More than 100 species belong to it; the range of distribution includes all Africa, southern Europe and large parts of Asia (Map 8). A similar distribution pattern shows **Creoleon,** also a complex group of about 80 species (Map 7).

No maps are provided for **Pseudoformicaleo** (1 species in North Africa and the Near East and some rather doubtful records and synonymies from Japan to Australia) and **Nemoleon,** a clear Afrotropical genus with 1 species recorded from Central Africa to Spain.

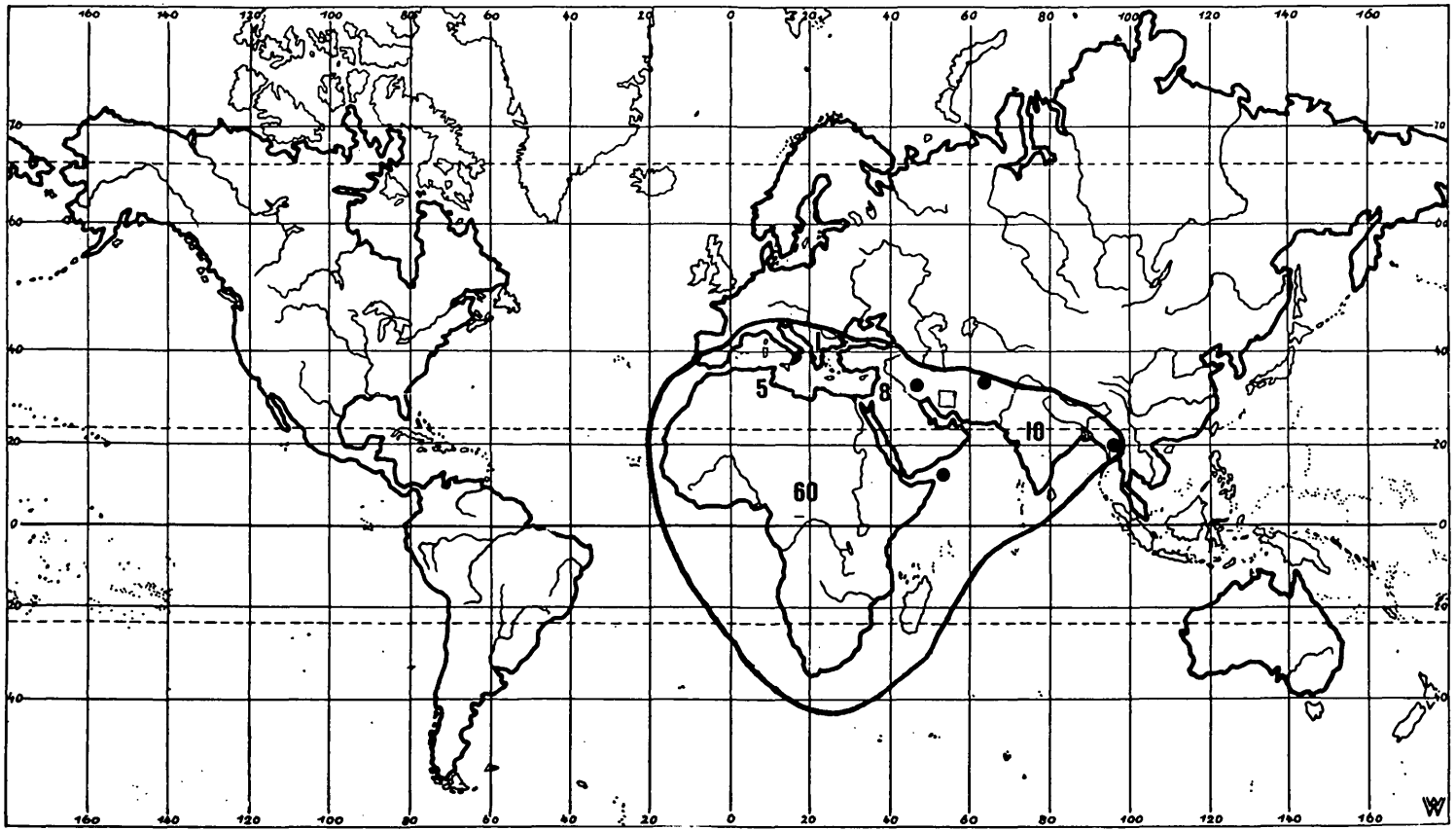
3.7. The major part of **GLENURINI** (Map 9) lives in South America and Australia; the tribe is apparently lacking in tropical Africa. In the Palearctic we know only a few species, arranged in 6 genera: **Megistopus** and **Gymnocnemia** with altogether 3 species are strictly Mediterranean, **Nedroledon** with 3 species eastern Mediterranean from Greece to Iran, **Glenuroides** with 1 species in Japan, **Indophanes** with 3 species in Afghanistan, China and Ceylon. Only in the Himalayan Mountains 1 species of **Negrokus** is recorded.

3.8. The **ACANTHACLISINI** (Map 10) comprise about 100 species in 18 genera. The distribution covers the whole inhabited world without any remarkable centre. The genus **Acanthaclisis** is not represented in America and in tropical Africa. So far we know 8 species in the Palearctic and 8 in Australia. The largest genus seems to be **Centroclisis** with about 50 species; most of them occur in tropical Africa, only 2 are recorded from North Africa and the Arabian Peninsula. A similar distribution pattern shows **Syngenes** (including **Onclus**) with 6 described species, only one of them living in Arabia. From North Africa and Arabia we know **Phanoclisis** (1 species) and from the Himalayan Mountains 1 species of **Stiphroneura.**

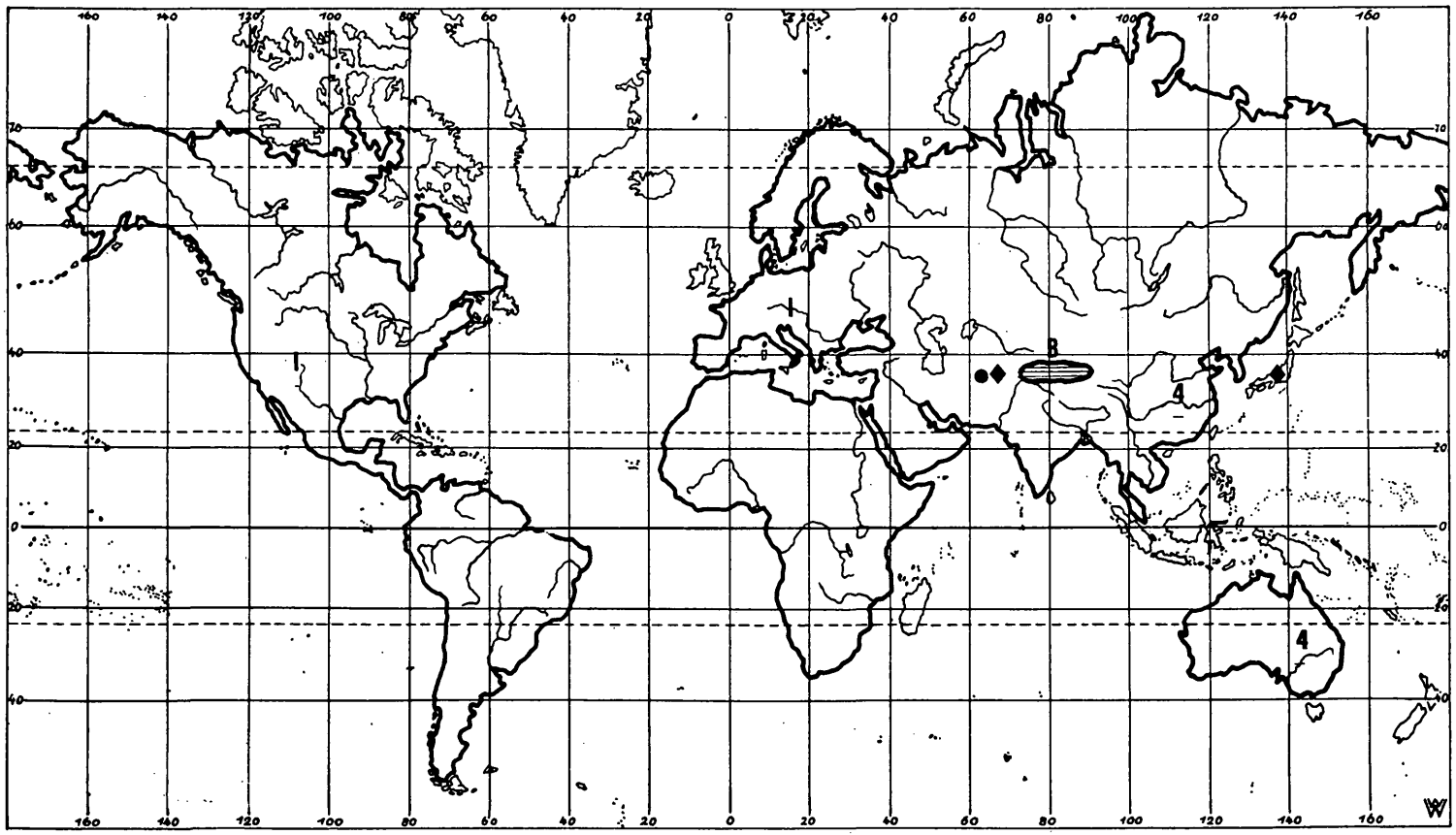
3.9. The **ISOLEONINI** sensu HÖLZEL (1972) include the Nesoleonini, Gepini and parts of Myrmecaelurini sensu MARKL (1954). The tribe comprises 8 genera with about 130 species. The majority belongs to **Cueta** (Map 11) (about 80 described species), distributed all over Africa including the Cape Verde Islands and wide parts of Asia including Mongolia. All hitherto known **Cueta**-larvae construct pitfalls. With the exception of **Furgella** (1 species in Southwest-Africa) all other genera have a rather restricted area of distribution in North Africa and western Asia (Map 12): **Gepus** (6 sp.), **Solter** (22 sp.), **Isoleon** (2 sp.), **Maracanda** (3 sp.) in North Africa and Near East, **Gepella** (1 sp.) in Near East and **Mongoleon** (3 sp.) in Mongolia.

3.10. The **MYRMECAELURINI** contain 4 closely related genera with about 70 species. Most of them belong to Myrmecaelurus (including **Nohoveus** and **Aspoeckina,** 55 sp.) distributed over southern Europe, North Africa including the Cape Verde Islands and wide parts of Asia. Also a wide range of distribution shows 1 species of **Lopezus** (North Africa to Mongolia), whereas **Nophis** (3 sp.) and **Iranoleon** (10 sp.) are restricted to small parts of North Africa and the Near East (Map 13).

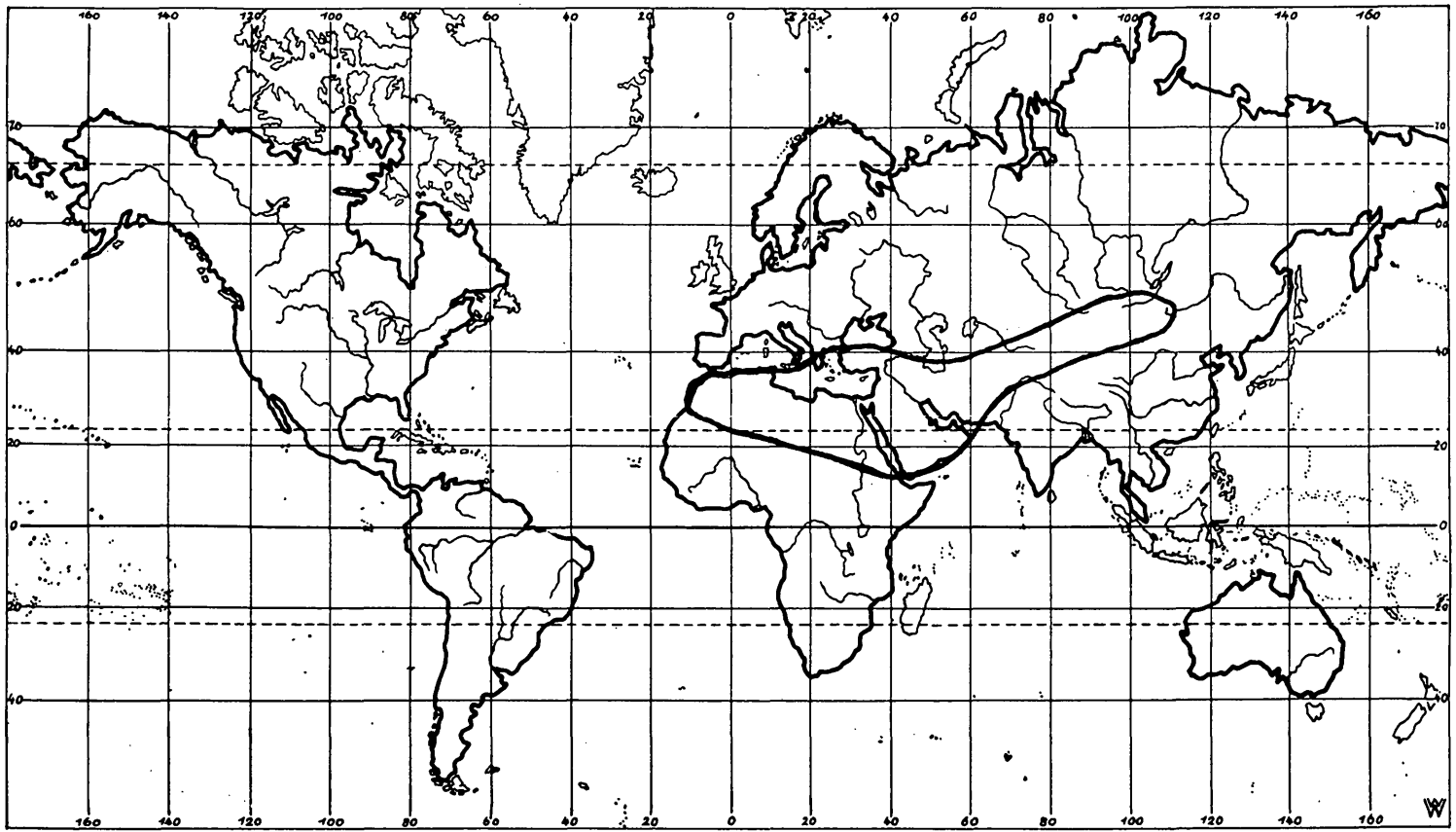
3.11. The **MYRMELEONINI** are distributed over the whole inhabited world without any remarkable centre. This tribe contains about 30 genera with more than 200 species. Only 3 genera are represented in the Palearctic: **Myrmeleon,** the only genus with species distributed over the whole world, contains about 100 described species. In this region we know 12, recorded from the Canaries and Madeira in the west to Japan in the east. The closely related genus **Euroleon** (Map 14) comprises 7 species which show a typical Eurosiberian distribution pattern. Finally the genus **Hagenomyia** with 1 species in Japan, a few in the Oriental region and 2 in tropical Africa. All known larvae of this tribe do construct pitfalls.



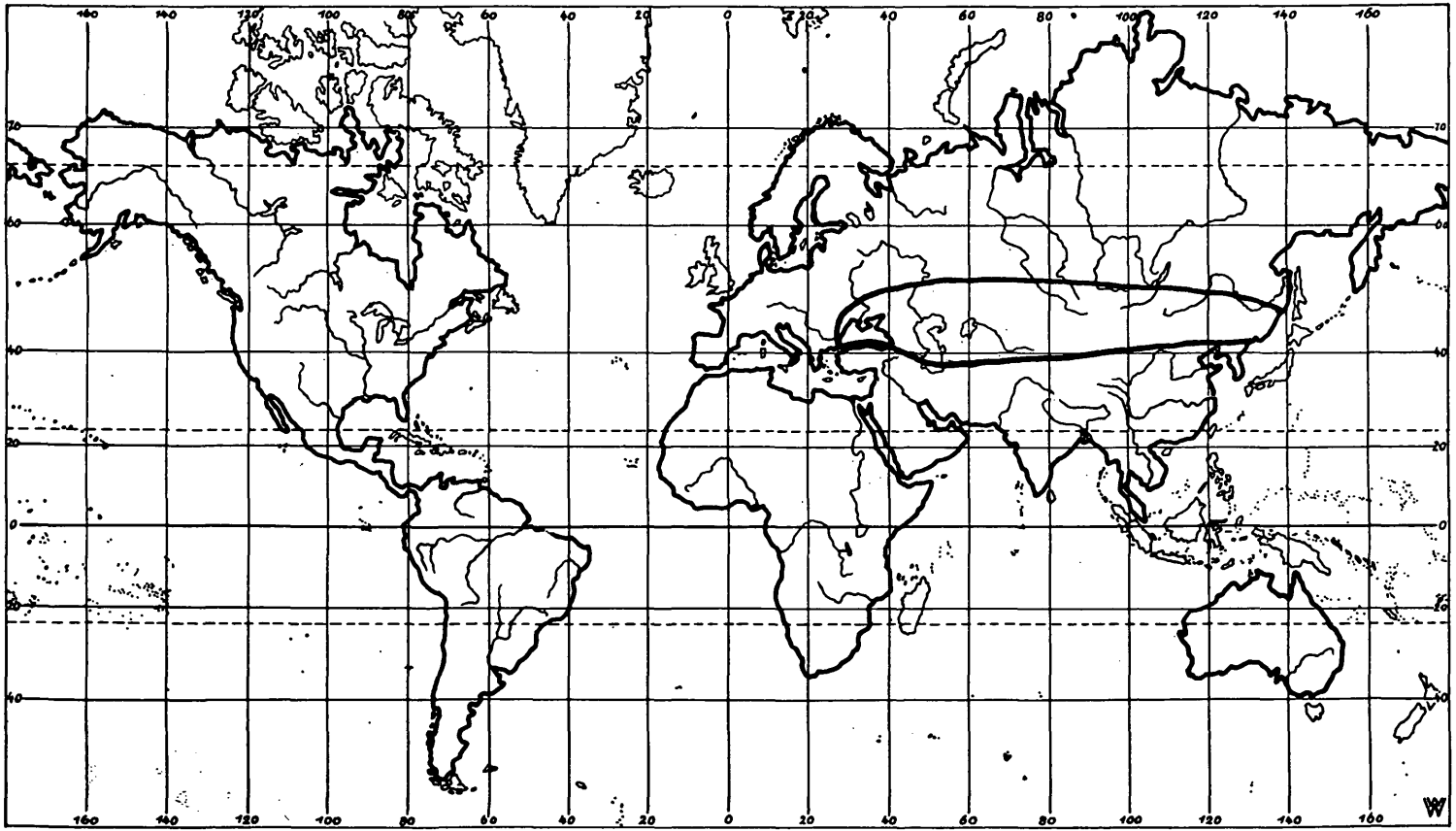
Map 2: Distribution of subfamily Palparinae: ● Echthromyrmicini □ Pseudimarini.



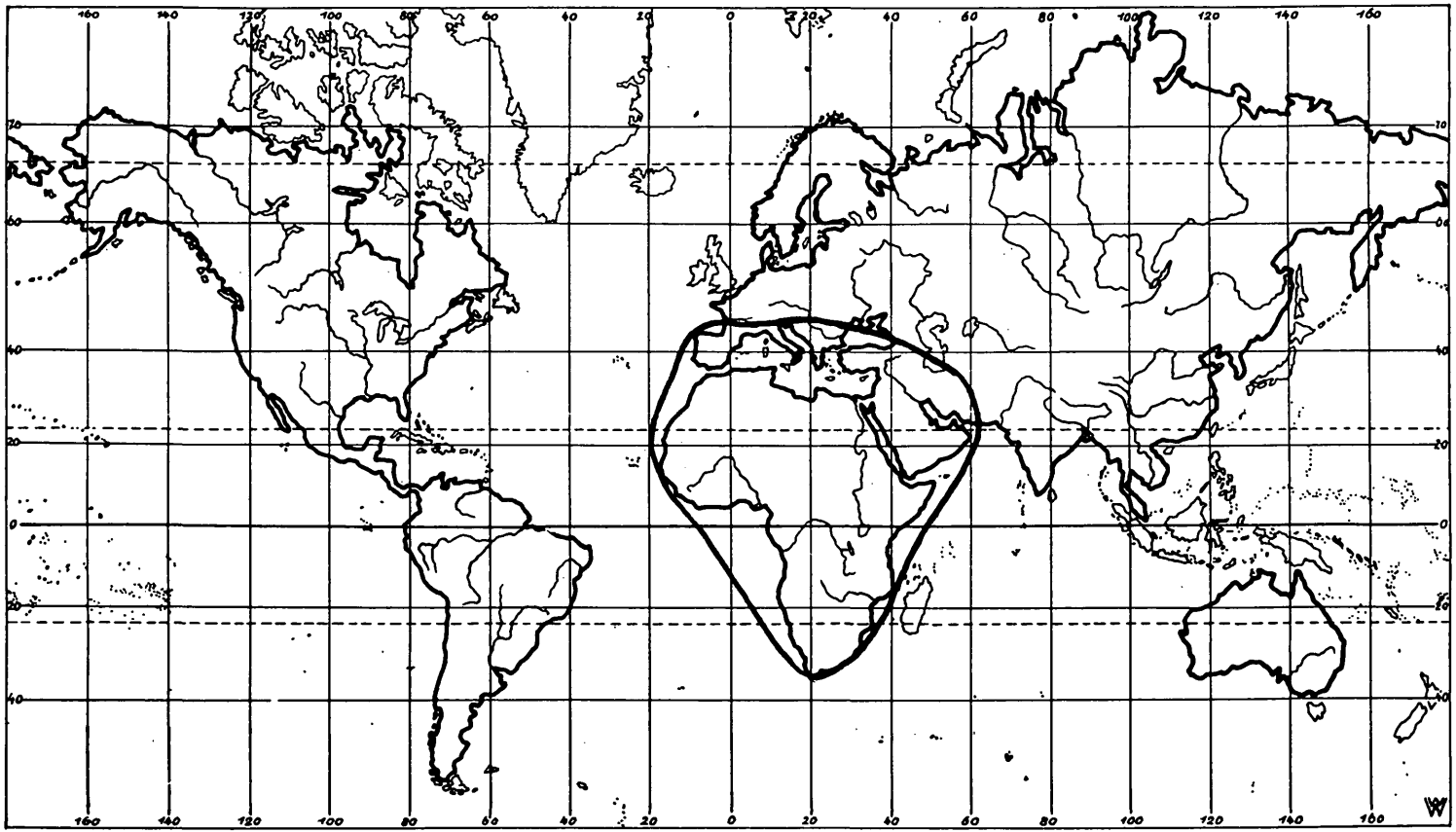
Map 3: Distribution of palearctic Dendroleonini: ◆ **Epacanthaclisis** ● **Afghanoleon** B **Borbon, Gatzara, Layahima**; the figures indicate the number of **Dendroleon** spec.



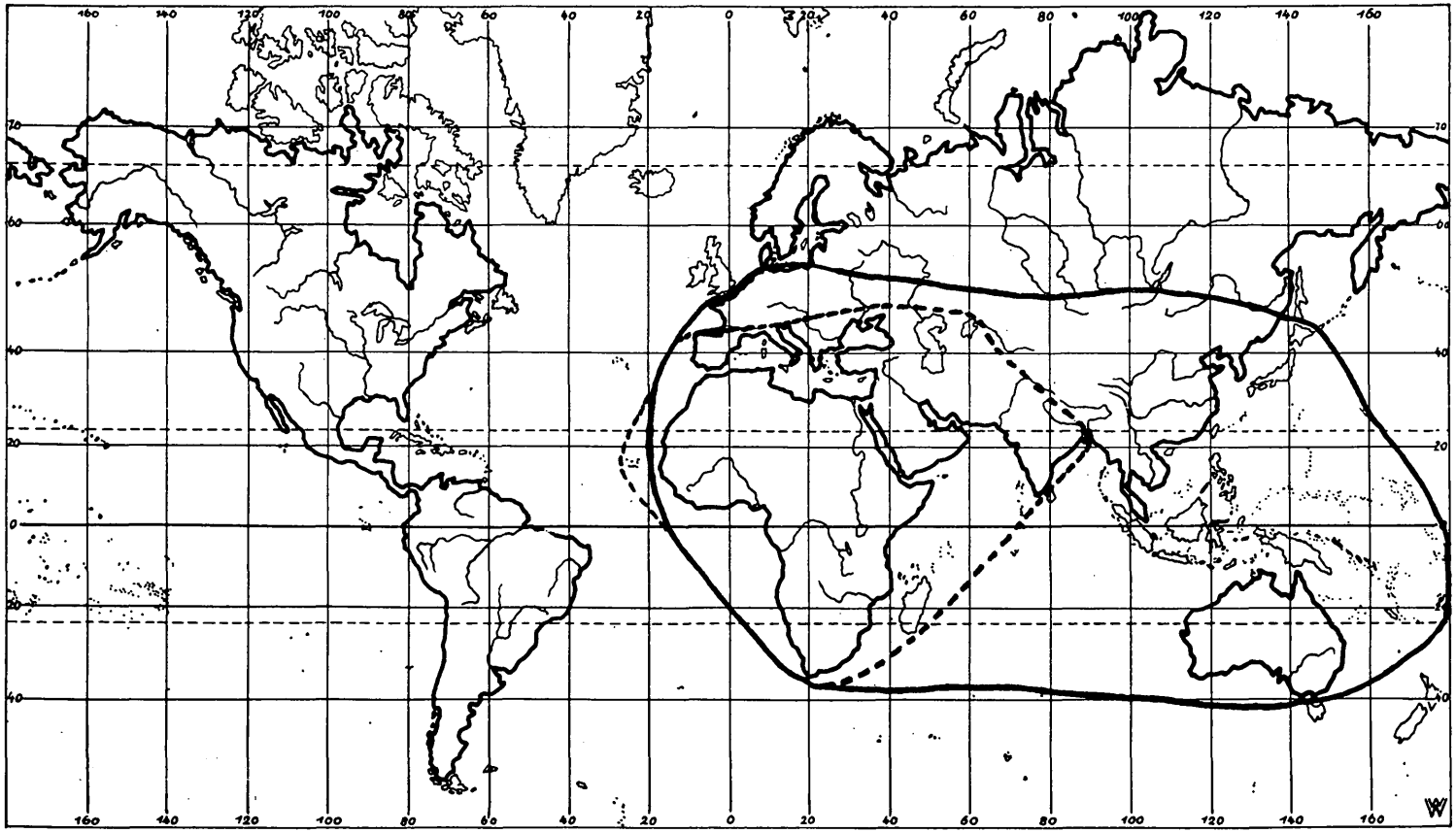
Map 4: Distribution of palearctic Distoleonini: **Nicarinus, Quinemurus, Graonus, Barreja, Geyria, Ganguilus, Delfimeus, Mesonemurus.**



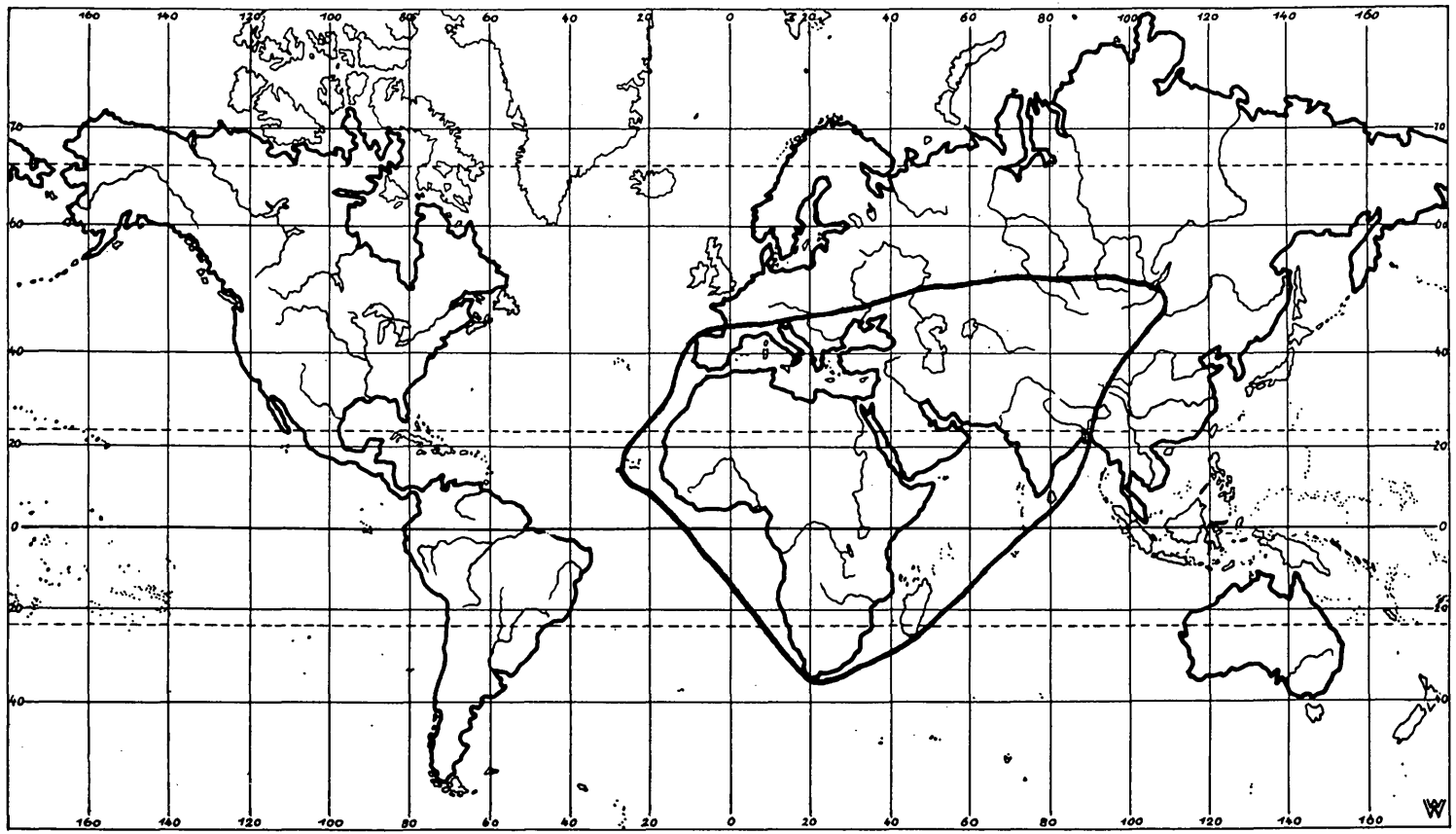
Map 5: Distribution of palearctic Distoleonini: **Deutoleon.**



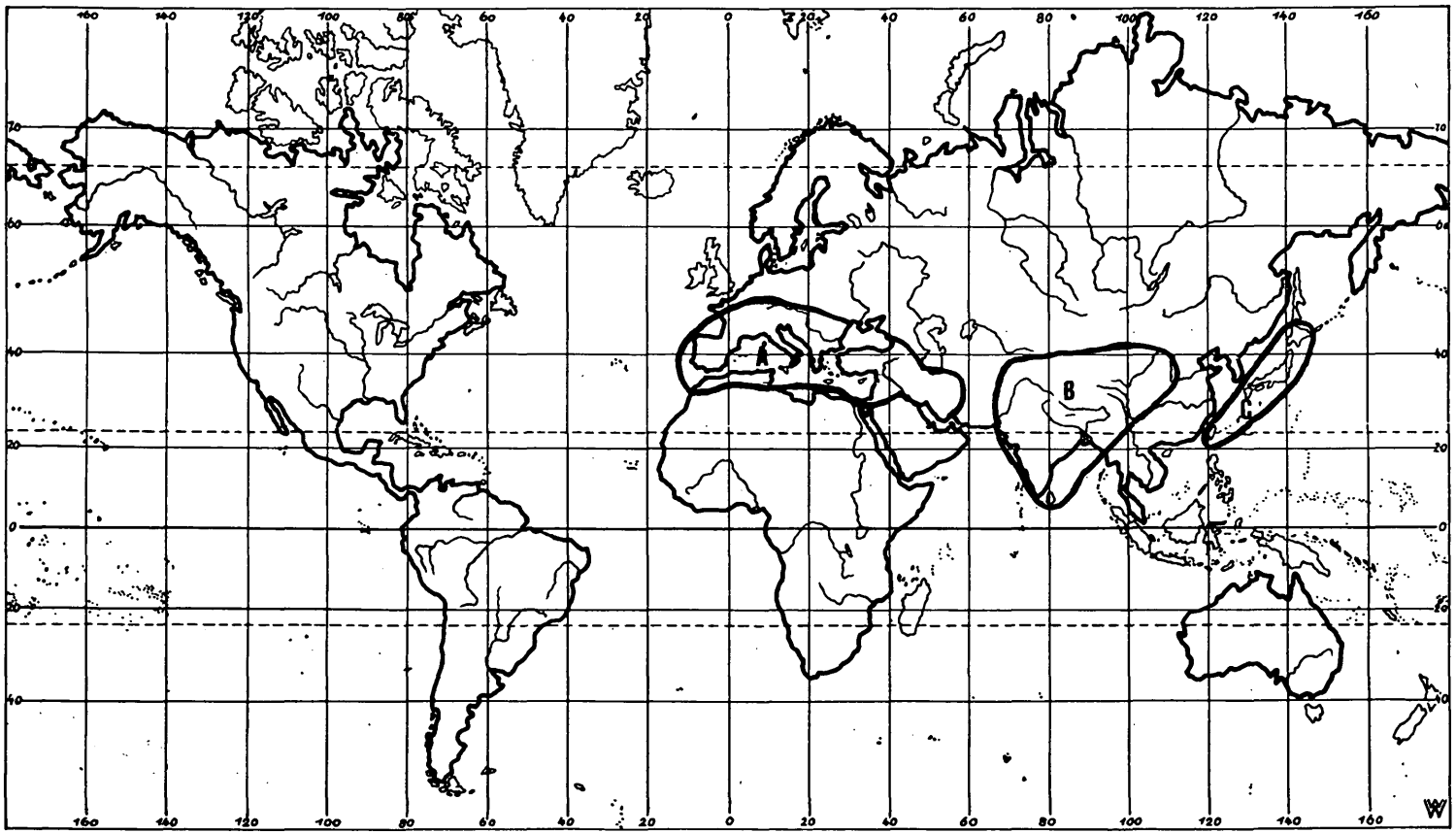
Map 6: Distribution of Distoleonini: **Macronemurus.**



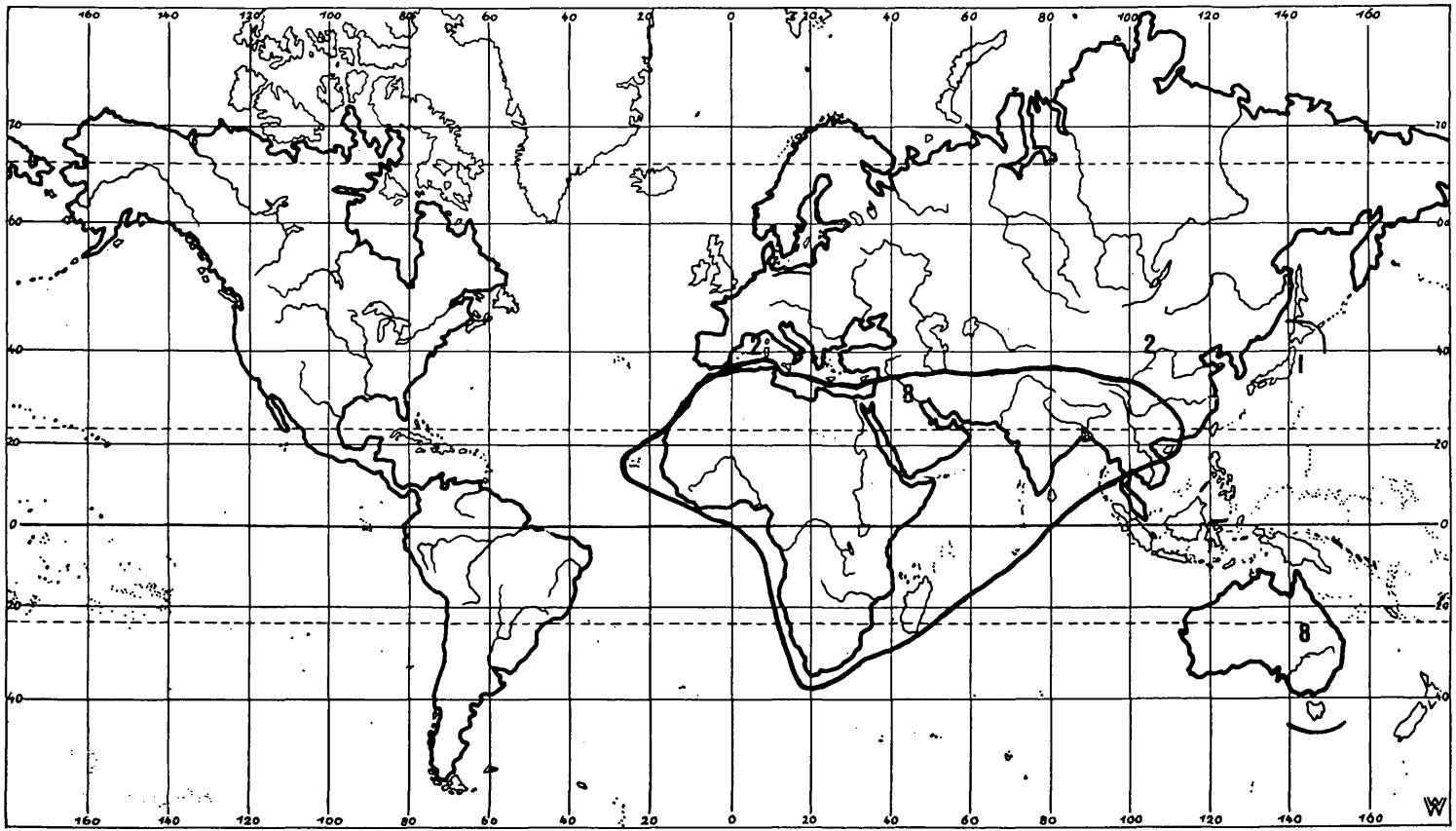
Map 7: Distribution of Distoleonini: — **Distoleon** - - - **Creoleon.**



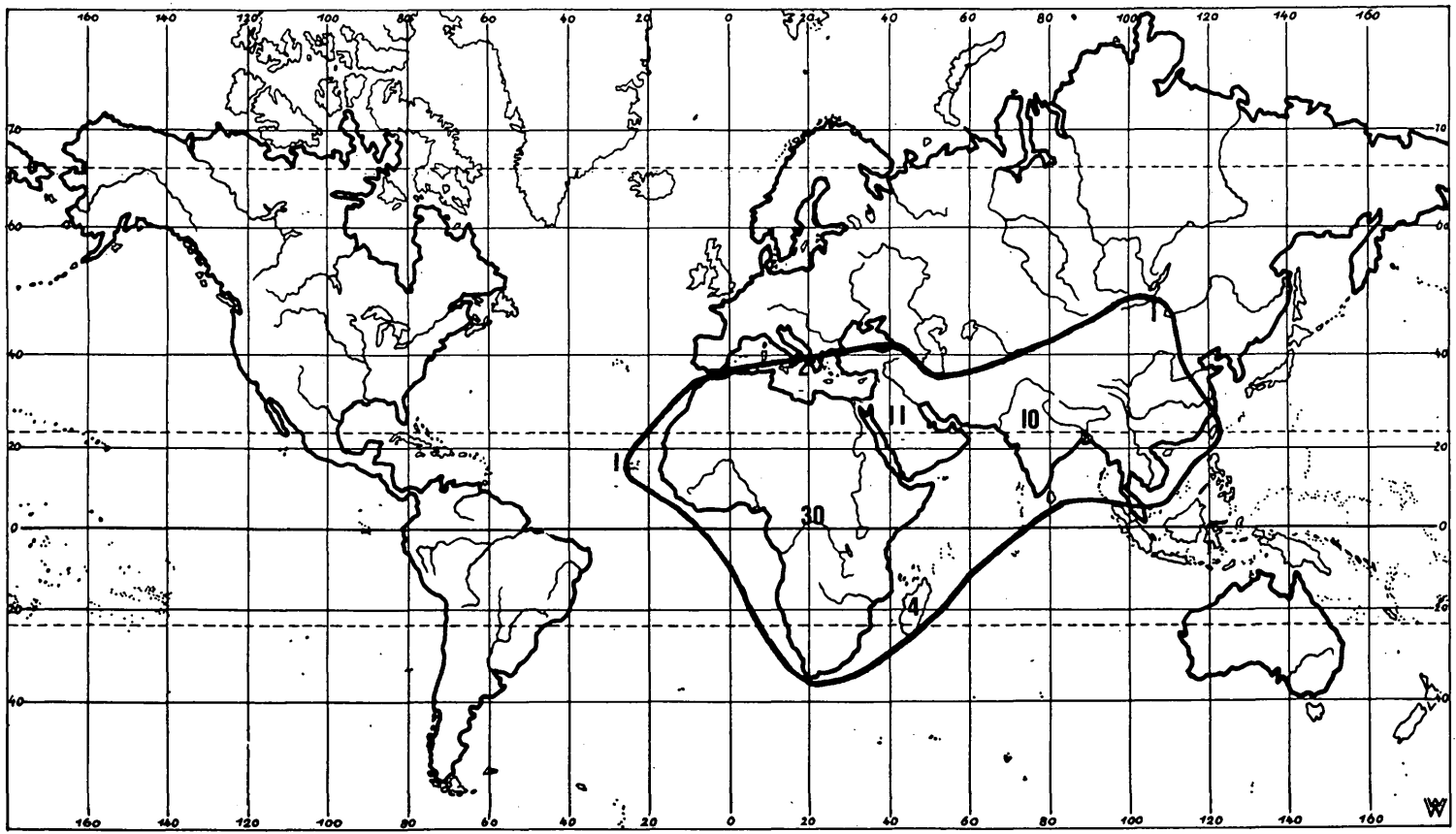
Map 8: Distribution of Distoleonini: **Neuroleon.**



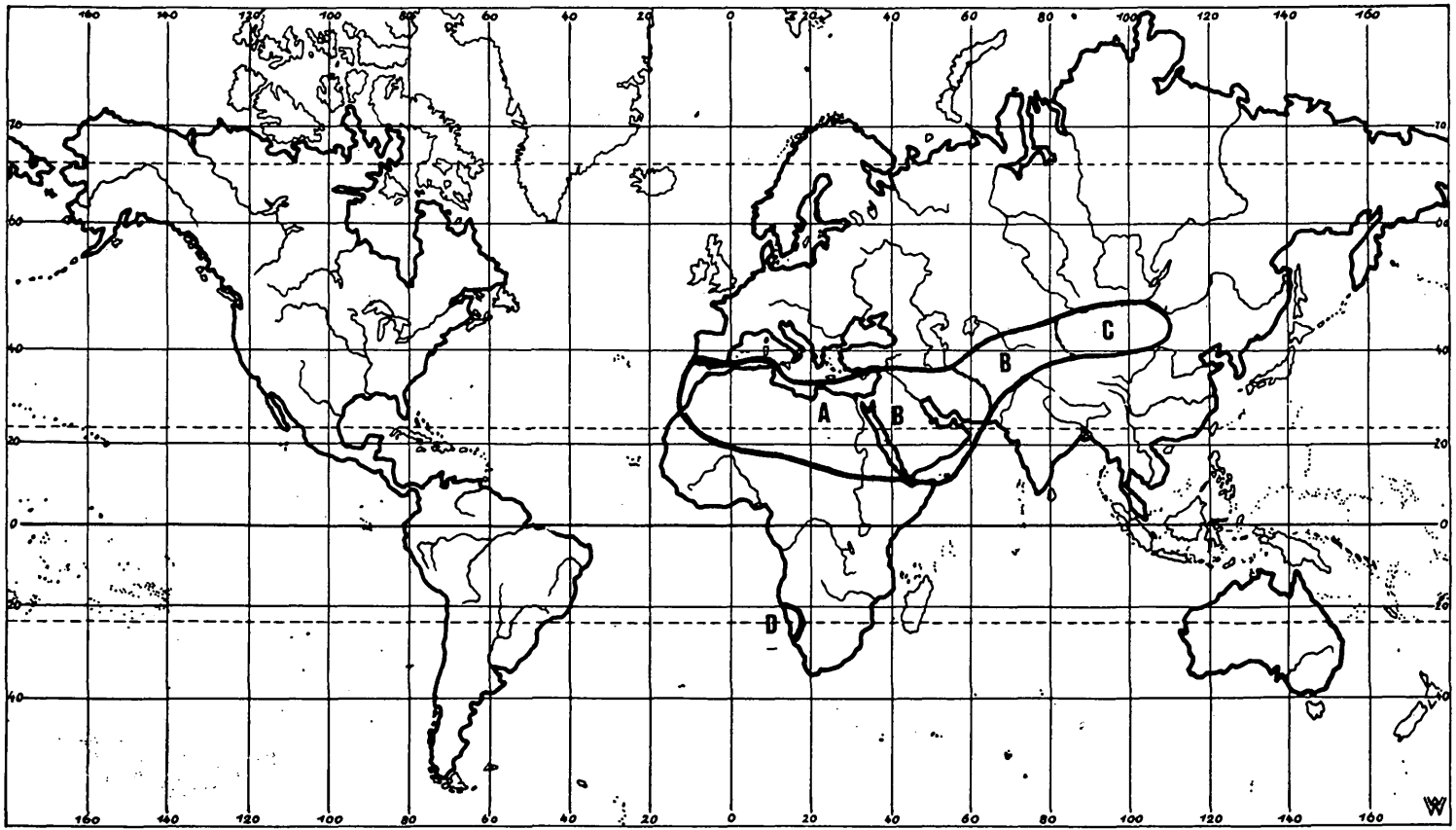
Map 9: Distribution of palearctic Glenurini: A) **Megistopus, Gymnocnemia, Nedroledon** B) **Indophanes, Negrokus** C) **Glenuroides.**



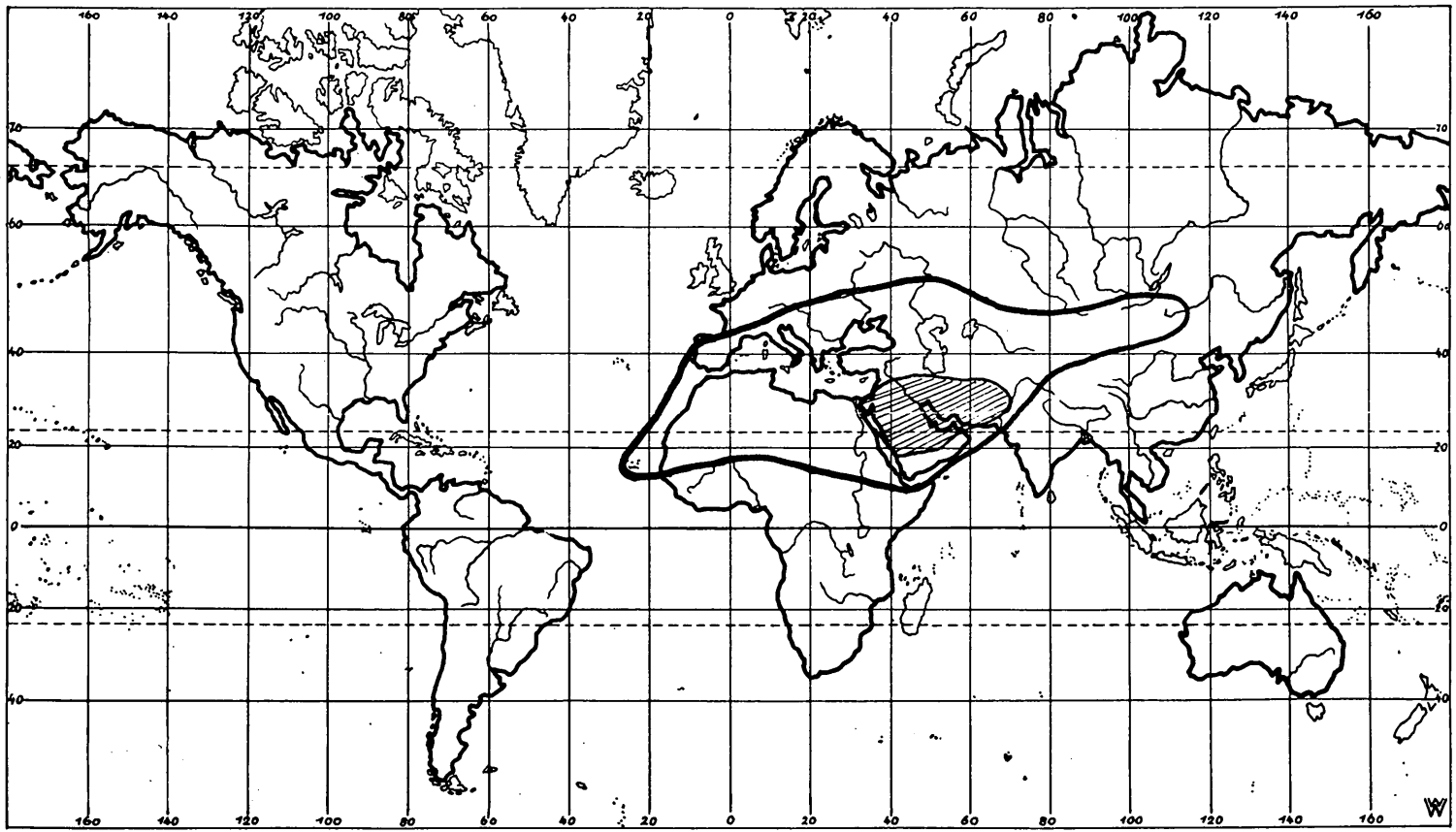
Map 10: Distribution of some palearctic Acanthaclisini: **Centroclisis** and **Syngenes**; the figures indicate the number of **Acanthaclisis** spec.



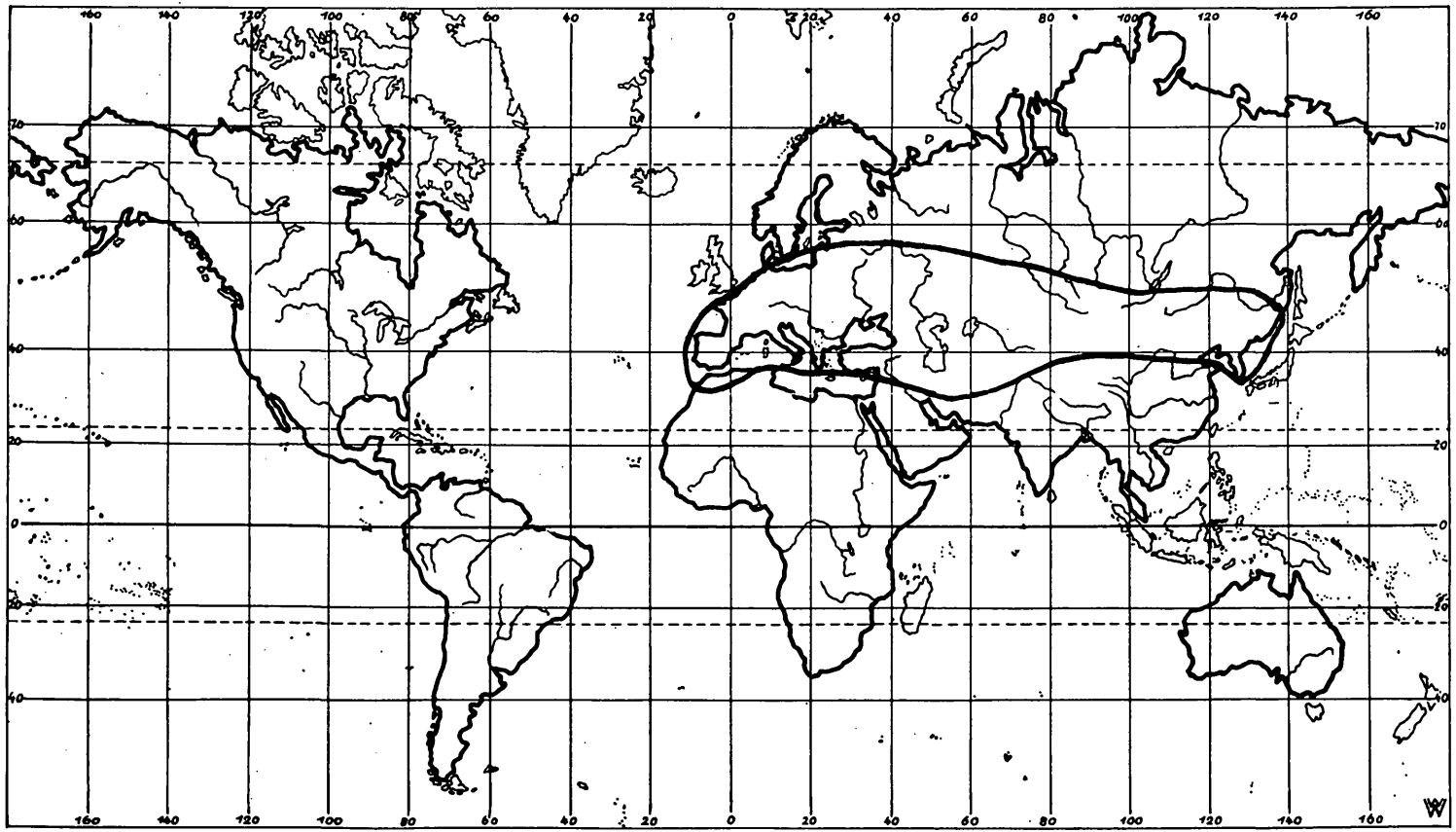
Map 11: Distribution of Isoleonini: **Cueta.**



Map 12: Distribution of Isoleonini: A) **Gepus, Solter, Gepella, Isoleon** B) **Maracanda** C) **Mongoleon** D) **Furgella.**



Map 13: Distribution of Myrmecaelurini: **Myrmecaelurus, Nophis, Lopezus**; hatched area: **Iranoleon.**



Map 14: Distribution of some Myrmeleonini: **Euroleon.**

4. CONCLUDING REMARKS

In the Palearctic region ant-lions reveal a few main distributional trends. There is a rich fauna, characterized by a high degree of endemism, inhabiting the arid parts in the south of the region (North Africa, Arabian Peninsula, Iran); approximately 250 species (83 %) are known only from these areas. In the more eastern parts of the region (with centres in Mongolia, Nepal, China and Japan) we know approximately 35 species (12 %). A few species (5) are Siberian (or Mongolian) faunistical elements and reveal an Eurosiberian distribution pattern; 4 species are only inhabiting midatlantic islands. The remainder is too inadequately known to be categorized at present, not to mention the remarkable sphere of influence of Oriental elements in the Far East and of Afrotropical elements in the Arabian Peninsula.

5. REFERENCES

ASPÖCK, H., ASPÖCK, U., HÖLZEL, H. (unter Mitarbeit von H. RAUSCH), 1980. Die Neuropteren Europas. 2 Bde, Goecke u. Evers, Krefeld.

BANKS, N., 1911. Notes on African Myrmeleonidae. Ann. ent. Soc. Am. 4:1-29.

BANKS, N., 1927. Revision of the Nearctic Myrmeleonidae. Bull. Mus. comp. Zool. Harv. 68:1-84.

ESPEN-PETERSEN, P., 1918. Help-notes towards the determination and the classification of the European Myrmeleonidae. Ent. Meddr. 12:97-127.

HÖLZEL, H., 1972. Die Neuropteren Vorderasiens IV. Myrmeleonidae. Beitr. naturk. Forsch. SüdwDtl. 1:3-103.

LATTIN, G. de, 1967. Grundriß der Zoogeographie. 602 pp. G. Fischer Verlag, Stuttgart.

MANSELL, M., 1985. The ant-lions of southern Africa (Neuroptera: Myrmeleontidae). Introduction and genus Bankisus Navás. J. ent. Soc. sth. Afr. 48:189-212.

MARKL, W., 1954. Vergleichend-morphologische Studien zur Systematik und Klassifikation der Myrmeleoniden (Insecta, Neuroptera). Verh. naturf. Ges. Basel 65:178-263.

NEW, T. R., 1982. A reappraisal of the status of the Stilbopterygidae (Neuroptera: Myrmeleontoidea). J. aust. ent. Soc. 21:71-75.

NEW, T. R., 1985. A Revision of the Australian Myrmeleontidae (Insecta: Neuroptera). I. Introduction, Myrmeleontini, Protoplectrini. Aust. J. Zool., Suppl. Ser. 104:1-90.

RIEK, E. F., 1970. Megaloptera. Neuroptera. In: The Insects of Australia: 465-494. CSIRO, Melbourne.

STANGE, L. A. 1961. Lectotype Designations in the New World Myrmeleontidae. Can. Ent. 93:674-677.

STANGE, L. A., 1970. Revision of the ant-lion tribe Brachynemurini of North America (Neuroptera: Myrmeleontidae). Univ. Calif. Publs Ent. 55:166 pp.

STANGE, L. A., 1976. Classificación y catálogo mundial de la tribu Dendroleontini con la redescripción del género Voltor Navás (Neuróptera: Myrmeleontidae). Acta zool. lilloana 31:261-320.

Address of the author: Herbert H ö l z e l
Annenheim 160
A-9520 Sattendorf, Austria