Acarologia is proudly non-profit, with no page charges and free open access

Please help us maintain this system by encouraging your institutes to subscribe to the print version of the journal and by sending us your high quality research on the Acari.

Subscriptions: Year 2021 (Volume 61): 450 €

http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php

Previous volumes (2010-2020): 250 € / year (4 issues)

Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France

ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d’avenir » programme (Labex Agro: ANR-10-LABX-0001-01)

Acarologia is under free license and distributed under the terms of the Creative Commons-BY.
A RE-EVALUATION OF THE PARHOLASPINAE EVANS 1956

(ACARINA : MESOSTIGMATA : MACROCHELIDAE) 1

BY

G. W. KRANTZ 2

INTRODUCTION.

In his review of the subfamily Parholaspinae, Evans (1956) stressed a number of morphological characters which he considered to be of importance in separating the parholaspine complex from the subfamily Macrochelinae Trägårdh. Among these characters were the structure of the peritreme and the presence or absence of lateral accessory sclerites on the epigynial shield. The two subfamilies were separated as follows:

1. Peritreme with a U-shaped loop and leaving stigma posteriorly; genital shield with lateral sclerites ........................................... Macrochelinae Trägårdh
   - Peritreme straight and leaving stigma anteriorly; genital shield without lateral sclerites ........................................... Parholaspinae subfam. nov."

The lack of a well-developed rod-like seta on the distal end of the palpal tarsus and the fusion of the peritrematal and exopodal shields in the Parholaspinae were characteristics also stressed in Evans' review. In addition, it was pointed out that parholaspine species never have a tectum which is produced medially into a trifid process, a condition commonly encountered in the Macrochelinae (fig. 4).

Trägårdh (1952) established the subfamily Areolaspinae in order to accommodate the genus Areolaspis, the type species of which has fused exopodal and peritrematal shields. As mentioned above, this type of fusion also occurs in the parholaspine complex. Because of the obvious major differences between the parholaspines and the areolaspines, and in the light of the close similarity between the Areolaspinae and the Macrochelinae, Evans felt that placing the parholaspines and areolaspines into a common subfamily on the basis of peritrematal

1. Accepted as Technical Paper n° 1310, Oregon Agricultural Experiment Station.
2. Assistant Professor of Entomology, Oregon State College, Corvallis, Oregon.

and exopodal fusion was unwarranted. For this reason he discarded the name Areolaspinae, placing Areolaspis into the subfamily Macrochelinae.

The family Macrochelidae, as now constituted, includes species which have an entire dorsal shield, a three-tined palpal claw, one or two stout setal brushes at the base of the movable cheliceral digit, a ventri-anal or geniti-ventri-anal shield, and no claws on legs I. While other characters are useful in providing identification (number of setae on the dorsal shield, condition of the tectum),

---

Fig. 1, Neparkholaspis evansi n. sp., Pretarsus III of female; Fig. 2, Macrocheles dimidiatus Berlese, Pretarsus III of female; Fig. 3, Areolaspis sp., Pretarsus IV of female; Fig. 4, Macrocheles sp., Tectum; Fig. 5, Tectal variation in Holaspulus tenuipes Berlese.

they appear to be secondary to those mentioned above. The genus Neopodocinum Oudemans includes species with an anal shield rather than the typical ventri-anal or geniti-ventri-anal shield found in other macrochelid genera. Species of Neopodocinum are easily identified as macrochelids, however, on the basis of the presence of a cheliceral setal brush, lack of claws on legs I, and looped peritremes.

Generally the most important single character used by authors in separating the Macrochelidae from related parasitoid groups has been the lack of claws on legs I (Oudemans 1929; Evans 1956). The condition of the palpal claw, the
ventral armature and the chelicerae have been little more than secondary supporting characters, inasmuch as related families frequently exhibit one or more of these latter features.

Recently, a number of parholaspine mites which were found to possess claws on legs I were studied by the author. A re-examination of the classification of the Macrochelidae, and a study of described and undescribed parholaspine species reveals a need for a revision of the Macrochelidae sensu Evans 1956, based upon the following factors:

1. All parholaspine examined have, as pointed out by Evans, a straight peritreme and a fused podal-peritrematal shield. The Macrochelinae exhibit a looped peritreme and, with few exceptions (Areolaspis, Euholocelaeno), a free peritrematal shield.

2. While some species of parholaspine mites have claws on legs I, no macrochelinae species have ever been found which display this character.

3. Parholaspines have neither well-developed accessory sclerites on the lateral margins of the epigynial shield nor a prominent sensory rod on the palpal tarsus, structures commonly seen in the Macrochelinae.

4. Mites of the subfamily Macrochelinae have, as a basic formula, twenty-eight pairs of simple and/or pectinate setae on the dorsal shield, while parholaspine mites may have twenty-nine or more simple or spatulate setae. Pectinate or plumose setae never occur in the latter group.

5. The majority of parholaspine species observed have the empodial element of the palpal claw broadly spatulate distally (fig. 35). The proximal element often shows a similar development. Macrochelinae species only rarely show expansion of this magnitude.

6. The pilus dentilis is well developed in the Macrochelinae, and only poorly developed in the Parholaspininae.

7. In the Macrochelinae, pretarsi II-IV each are equipped with a pair of laterodistal elements which may be acuminate, serrate, or divided distally (figs. 2, 3). When distally acuminate, the element is broadly membranous throughout most of its length. In the Parholaspininae, the laterodistal elements of pretarsi II-IV are setate (fig. 1) or apparently absent.

8. Pre-sternal shields are present in all but one described parholaspine (Parholaspis kevensis Evans), but are absent in macrochelines.

9. Except for the genera Geholaspis Berlese (Valle 1953) and Neopodocinum Oudemans, the macrochelinae mites have a medial trifid process on the tectum which is never seen on parholaspine species.

10. Parholaspine mites are entirely free-living, while many macrochelinae forms are found as insect paraphages.

If one were to consider as primary morphological characters only the condition of the peritreme and the relative development of the accessory sclerites on the
epigynial shield, it might be more to the point to group the parholaspines with the Neoparasitidae (sensu EVANS 1956 b) rather than with the Macrochelidae. Both the Neoparasitidae and the Parholaspinae have an entire dorsal shield, a three-tined palpal claw, poorly developed accessory sclerites, and straight peritremes. On the other hand, the presence in both the Macrocheliniae and Parholaspinae of one or two stout setal brushes at the base of the movable cheliceral digit (fig. 9), structures which have not been seen to occur in other parasitoid families, might indicate that these two groups are elements of a single family. The importance of the setal brush as a familial character, however, is questionable. Similar cheliceral structures occur in a number of families in the Supercohort Trigynaspida (Celaenopsidae, Diplogyniidae, and Cercomegistidae), while other trigynaspid families show variations in the position or shape of the simple brush form. Since this structure varies considerably within families (TRAÇARD 1950), it is of little importance in family separation, being used only as a secondary character in the diagnosis of the Supercohort. Its value, then, may be equated to that of the number of tines on the palpal claw, a number that varies both between and within families in the Monogynaspida and the Trigynaspida. As such, the presence of a setal brush is considered by the author to be of importance only as an indicator of relationships between familial or suprafamilial groups.

While any familial concept which may be advanced can be little more than arbitrary, it is felt that the above discussion offers sound arguments for a familial separation of the Macrocheliniae and the Parholaspinae. The Macrocheliniae is a well-integrated natural group in itself (EVANS and BROWNING 1955), and the retention of the parholaspine complex in an intrafamilial association with them seems unrealistic. Whether the parholaspines are more closely allied to the Macrochelidae or to the Neoparasitidae depends, in large part, on the relative importance of the setal brush and peritrematal characters discussed earlier.

The following two keys to related parasitoid families express the possible affinities outlined above.

A

1. With two tines on the palpal claw... **Laelaptidae, Acrosejidae**, and related forms
   - With three tines on the palpal claw.............................................. 2.
2. Palpal claw with a distal hyaline expansion; internal setae of the palpal genu spatulate, bifid, or comb-like distally; dorsal shield divided or laterally incised.... **Veigauidae**
   - Palpal claw without hyaline expansion; palpigena setae not as above; dorsal shield entire .......................................................... 3.
3. Peritreme looped proximally, joining stigma posteriorly; legs I without claws; epigynial shield with a pair of well-developed lateral accessory sclerites; free-living or insect paraphages ............................................. **Macrochelidae**
   - Peritreme normal, joining the stigma anteriorly; accessory sclerites weak or absent; legs I with or without claws; free-living.............................................. 4.
4. Corniculi long, sword-like; with a conspicuous setal brush at the base of the movable cheliceral digit; empodial element of palpal claw commonly spatulate distally; claws on legs I present or absent. **Parholaspidae nov.**

— Corniculi not long, sword-like, usually less than three times as long as their basal width; setae at base of movable cheliceral digit, when present, not forming a brush; empodial element of palpal claw not distinctly spatulate, proximal element often weakly developed; with claws on legs I. **Neoparasitidae**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>As in A.</td>
</tr>
<tr>
<td>2.</td>
<td>As in A.</td>
</tr>
<tr>
<td>3.</td>
<td>With one or two setal brushes, or with a brush and an adjacent coronet of setae (fig. 15), at the base of the movable digit of the chelicera; claws on legs I present or absent.</td>
</tr>
<tr>
<td></td>
<td>Setae at base of movable cheliceral digit, when present, not forming a distinct brush; with claws on legs I. <strong>Neoparasitidae</strong></td>
</tr>
<tr>
<td>4.</td>
<td>Peritreme looped proximally, joining the stigma posteriorly; legs I without claws; epignyial shield with a pair of well-developed lateral accessory sclerites; laterodistal elements of pretarsi II-IV divided or serrate distally, or membranous proximally; free-living or insect paraphages. <strong>Macrocheilidae</strong></td>
</tr>
<tr>
<td></td>
<td>Peritreme normal, joining the stigma anteriorly; accessory sclerites weak or absent; legs I with or without claws; laterodistal elements of pretarsi II-IV setate, not divided distally; free-living. <strong>Parholaspidae nov.</strong></td>
</tr>
</tbody>
</table>

**Classification.**

Family **Parholaspidae nov.**

Dorsal shield entire and with twenty-nine or more pairs of simple or spatulate setae. Peritreme joining the stigma anteriorly, with the entire structure in a fused exopodal-peritrematal shield. Lateral accessory sclerites between coxae IV weakly developed or absent. Females with three or four pairs of setae on the sternal shield; metasternal shields fused to sternal and/or endopodal shields, or free in the integument. With a ventri-anal, geniti-ventri-anal, or fused podal-peritrematal-geniti-ventri-anal shield. Males with a holoventral shield and a pre-sternal genital orifice; with a well-developed sperm transfer organ on the movable cheliceral digit. Movable digit in both sexes with a well-developed setal brush at its base. Corniculi long, sword-like, always more than three times as long as their basal width. Palpi with five free segments; internal palpal setae simple; palpal claw three-tined, with the empodial element often broadly spatulate distally. Tectum variable, but never with a median trifid process. Legs I with or without claws; laterodistal elements of pre-tarsi II-IV seta-like or absent; legs II of males variously spurred. Free-living species.
Type: Parholaspis desertus Berlese 1918.

Evans (1956a) presented a key to parholaspid species in which seven genera were recognized. The following is a revision of this key.

KEY TO THE GENERA OF THE FAMILY PARHOLASPIDAE.

(Females only).

1. Peritrematal shields fused to ventri-anal shield; usually with a pair of expulsive vesicles posterior or posterolateral to coxae IV; laterodistal elements of pretarsi II–IV considerably longer than associated claws. .......................... Parholaspis Berlese

2. Peritrematal shields not fused to ventri-anal shield; expulsive vesicles absent; laterodistal elements of pretarsi II–IV rarely exceeding in length the associated claws, or apparently absent. .......................... Neparholaspis Evans

3. Epigynial shield fused posteriorly to ventri-anal shield; dorsal seta on the fixed digit of the chelicera simple. .......................... Holespulus Berlese

4. Epigynial shield not fused to ventri-anal shield; dorsal seta on the fixed chelical digit wedge-shaped .......................... Neparholaspis Evans

3. Metasternal shields fused to the sternal shield; ventri-anal shield with more than four pairs of pre-anal setae. .......................... Calholaspis Berlese

4. Metasternal shields fused to endopodals III or free in the integument; ventri-anal shield with three or four pairs of pre-anal setae. ..........................

5. Setae M₁ (fig. 56) considerably shorter than D₁, or absent; anterior edge of dorsal shield rounded; with four pairs of pre-anal setae on the ventri-anal shield. ..........................

6. Setae M₁ as long as, and inserted lateral of, D₁ (fig. 79); anterior edge of dorsal shield usually truncate or slightly concave; with three or four pairs of pre-anal setae. ..........................

7. Dorsal shield with twenty-nine pairs of long simple setae; M₁ absent; movable chelical digit shorter than the corniculi; dorsal seta on the fixed chelical digit wedge-shaped .......................... Gamasholaspis Evans

8. Dorsal shield with thirty pairs of setae; M₁ short, simple, other dorsal setae broadly lanceolate; movable chelical digit longer than the corniculi; dorsal seta on fixed cheliceral simple .......................... Parholaspis Berlese

9. Tectum with two prominent lateral projections, as well as a central extension; ventri-anal shield never extending laterally beyond level of coxae IV. ..........................

10. Tectum variously produced, without a pair of prominent lateral projections; ventri-anal shield extending laterally beyond level of coxae IV. ..........................

11. Epigynial and ventri-anal shields coalesced or fused; movable digit of chelicera bidentate (fig. 18); metasternal shields free; femur IV without ventral spur. .......................... Neoparholaspulus nov.

12. Epigynial and ventri-anal shields not connected; movable digit of chelicera with two, or more than ten, teeth; metasternal shields free or fused to endopodals III; typically with a distinct ventral spur on femur IV. .......................... Parholaspulus Evans

13. Movable digit of chelicera shorter than corniculus; with well-developed claws on legs I of female (fig. 43). .......................... Lattinella nov.

14. Movable digit of chelicera as long or longer than corniculus; no claws on legs I of female .......................... Parholaspella nov.
Genus *Holaspulus* Berlese.


Dorsal shield with thirty pairs of setae, of which all but M₁ are spatulate distally. Extramarginal setae spatulate. Genital shield fused posteriorly to ventroanal shield. Metasternal shields free.

*Type: Holostaspis (Holaspulus) tenuipes* Berl.

Other generic characters are listed by Evans (1956 a), as is a key to species which is given below.

Key to species of *Holaspulus*.

1. Genital and ventroanal shields evenly reticulated; anterior margin of the genital shield extending well beyond the posterior margin of the sternal shield. Male unknown .......................................................... *Holaspulus viduus* Berl.  
   — Genital and ventroanal shields unevenly reticulated; anterior margin of the genital shield not extending beyond the posterior margin of the sternal shield ........ 2.

2. Sternal shield in the female with numerous closely set punctations; expulsory vesicles conspicuous. Spermatophoral process in the male considerably longer than the movable digit .......................................................... *Holaspulus tenuipes* Berl.  
   — Sternal shield in the female without closely set punctations; expulsory vesicles apparently absent. Spermatophoral process in the male shorter than the movable digit .......................................................... *Holaspulus tweediei* sp. n."

*Holaspulus tenuipes* Berl.

*Holostaspis (Holaspulus) tenuipes* Berlese, A. (1904) *Redia* 1 : 266.  

*Known distribution:* Italy, in greenhouse; Switzerland, in greenhouse; soil and organic matter under *Caryota mitis* in the Aroid House, Royal Botanic Gardens, Kew, England; on *Laelia gouldiana*, Mexico, D. F. (collected by J. B. R. Leary); on orchid plants, Mexico, D. F. (collected by Leary).

*Dimensions:*

Female: Length = 640-680 μ; width = 340-370 μ.  
Male: Length = 570-585 μ; width = 295-305 μ.

In examining specimens of *H. tenuipes* from Mexico (3 females) and comparing them with the description of European specimens studied by Evans, a variation was noted in the development of the tectum (fig. 5). In addition, one of the Mexican specimens appears to have indications of rudimentary claws on legs I. Because of the obvious similarities in regard to all other morphological structures, however, the author prefers to consider the Mexican and European
specimens conspecific. Intraspecific variation in the condition of tarsus I is not uncommon in the Parholaspidae, nor are tectal variations on the intraspecific level unknown.

**Holaspulus tweediei** Evans.


*Known distribution:* Singapore, inside a rotting tree (collected by M. W. F. Tweedie).

*Dimensions:*
- Female: Length = 520-535 μ; width = 270-275 μ.
- Male: Length = 480 μ; width = 255 μ.

**Holaspulus vidius** Berlese.


*Known distribution:* Java.

*Dimensions:*
- Female: Length = 550 μ.
- Male: unknown.

Genus *Neparholaspis* Evans.


Dorsal shield with thirty pairs of simple or spatulate setae. Metasternal shields in female fused to sternal and/or endopodal shields, or free. Peritrematal shield fused to ventri-anal and exopodal shields. Females usually with a pair of expulsory vesicles located posterior to or postero-laterad of coxae IV; vesicles absent in males. Males with a holoventral shield; genital orifice pre-sternal. Corniculus longer than the movable digit of the chelicera in both sexes. Dorsal seta at the base of the fixed cheliceral digit wedge-shaped. Legs I with or without claws. Free-living in forest litter or moss.

*Type:* *Neparholaspis spatulatus* Evans.

*Key to species of Neparholaspis.*

1. Third pair of sternal setae whip-like, considerably longer than second pair........ *Neparholaspis crispus* (Willmann)

— Third pair of sternal setae similar in length to second pair.................. 2

2. Metasternal shields fused to the sternal and/or endopodal shields.................. 3
Metasternal shields not fused to sternal or endopodal shields but lying between them.

3. Dorsal setae spatulate distally; dorsal element of the spermatophoral process more than three times the length of the ventral element.  *Neparholaspis spathulatus* Evans

Dorsal setae simple; dorsal element of the spermatophoral process only slightly longer than the ventral element.  *Neparholaspis simplex* Evans

4. Lateral margin of dorsal shield and lateral interscutal membrane with a pelage of short setae; sternal shield evenly reticulate.  *Neparholaspis marginipilis* (Evans)

Lateral margin of dorsal shield and lateral interscutal membrane without setal pelage; sternal shield with uneven reticulation...  *Neparholaspis evansi* n. sp.

*Neparholaspis spathulatus* Evans.


*Known distribution*: Malaya, litter and topsoil in a forest at Sungei Buloh, Selangor (collected by J. R. Audy).

*Dimensions*:

Female: Length = 1050-1100 μ; width = 810-820 μ.

Male: Length = 780-800 μ; width = 710-715 μ.

*Neparholaspis simplex* Evans.


*Known distribution*: Malaya, forest litter and topsoil, Sungei Buloh, Selangor (collected by J. R. Audy).

*Dimensions*:

Female: Length = 920-950 μ; width = 620-630 μ.

Male: Length = 814 μ; width = 605 μ.

*Neparholaspis evansi* n. sp.

*Female* (figs. 6-9, 12). Length of idiosoma = 888-994 μ; width of venter at coxae IV = 444-497 μ.  *Dorsal shield* with thirty pairs of simple setae, of which all but D₁ and D₈ are long and whip-like; dorsal shield reticulated and clearly marked with muscle attachment patterns and pores.  *Tritosternum* bipartite distally; with an elongate truncated base and plumose lacinae. With a pair of narrow *pre-sternal shields* extending from the posterolateral angles of the tritosternal base to the bases of coxae I.  *Sternal shield* strongly but unevenly reticulate (fig. 6) and fused with the podal and peritrematal shields; extending posteriorly to the middle of coxae III; sternal setae long, simple, and in two nearly
straight lines; sternal pores as illustrated. **Metasternal shields** free, lying between the sclerotized posterior margins of the sternal shield and the median margins of endopodals III; metasternal setae long and simple. **Epigynial shield** rounded anteriorly and truncate posteriorly; ornamentation as on sternal shield;

---

**Figs. 6-11. — Neparholaspis evansi n. sp.**

Fig. 6, Venter of female; Fig. 7, Tarsus I of female; Fig. 8, Tectum of female; Fig. 9, Chelicera of female; Fig. 10, Femur, genu and tibia II of male; Fig. 11, Chelicera of male.
with a pair of long setae on the posterolateral corners; perigenital rim present. *Ventri-anal shield* fused to podal-peritrematal shield; with four pairs of ventral setae, the most anterior pair being inserted posterior to the expulsory vesicles. *Expulsory vesicles* distinct, located posterior to, or posterolateral of, coxae I. *Stigma* located between and lateral of coxae III-IV; peritreme extending anteriorly and dorsally to a point beyond the insertions of coxae I; peritrematal shield fused to podal and sternal elements; with a large pit-like "pore" posterior to the stigmata, and a similar structure lateral of the peritreme at a level between coxae II-III. *Palpi* 5-segmented; empodial element of palpai claw spatulate distally. *Corniculi* long, sword-like, exceeding the length of the movable digit of the chelicera by a ratio of 3 : 2. *Chelicerae* short; movable digit bidentate; dorsal seta on the fixed digit wedge-shaped. *Tectum* with a smooth distally rounded median projection flanked on either side by a small spined protuberance (fig. 8). *Legs* with long simple setae; legs I with claws (fig. 7); tarsus II with a pair of stout distal spines.

**Male** (figs. 10-11). Length of idiosoma = 817 μ; width of venter at coxae IV = 462 μ. *Dorsal shield* similar to that of female, except that the dorsal setae are somewhat shorter than in the female. Tritosternal and pre-sternal elements as in female. *Venter* with a single fused shield made up of sternal, podal, peritrematal and ventri-anal elements. *Genital orifice* pre-sternal. *Expulsory vesicles* absent. Tectum with median extension pointed distally. Movable digit of chelicera with a recurved spermatophoral process (fig. 11). Femur, genu, and tibia of leg II spurred (fig. 12); tarsus I with claw.

**Type material.** — Eighteen females and one male, from the following localities: *Holotype female* from Mary's Peak, near Philomath, Oregon, October 9, 1958, from moss near creek (collected by G. W. KRANTZ and B. D. AINSCOUGH); *allotype male* from Blodgett, Oregon, March 26, 1959, from hemlock litter near creek (collected by B. D. AINSCOUGH); one *paratype female* with the same collecting data as the allotype male; three paratype females from leaf mold under oak, 10 miles south of Salem, Oregon, 1941 (collected by J. C. CHAMBERLIN); three paratype females from alder and fir litter, near Timber, Oregon, April 19, 1941 (collected by J. C. CHAMBERLIN); two paratype females from moss litter, 2.5 miles southeast of Valsetz, Polk County, Oregon, March 8, 1959 (collected by J. D. LATTIN); two paratype females from litter of *Pinus contorta*, 2 miles north of Waldport, Oregon, February 1, 1959 (collected by J. D. LATTIN); one paratype female from hemlock, Mary's Peak, near Philomath, Oregon, July 25, 1959 (collected by B. D. AINSCOUGH); one paratype female from litter, Buck Lake, 6.5 miles north of Florence, Oregon, July 5, 1959 (collected by S. RADINOVSKY); one paratype female from fir treehole, 20 miles southwest of Philomath, Oregon, May 9, 1958 (collected by G. W. KRANTZ); one paratype female from leaf mold, 5 miles east of Mill City, Oregon, September 28, 1941 (collected by J. C. CHAMBERLIN); one paratype female from hemlock treehole, 0.2 miles east of Griffith Park Spur,
Mary's Peak, near Philomath, Oregon, July 28, 1959 (collected by G. W. Krantz); one paratype female from moss, 2 miles west of Harlan, Lincoln County, Oregon, April 9, 1959 (collected by J. D. Lattin). Holotype and allotype specimens will be deposited in the collection at the U. S. National Museum, Washington.

Fig. 12. — *Neparkolaspis evansi* n. sp., Dorsum of female.

Figs. 13-15. — *Calholaspis berlesei* n. sp.

Fig. 13. Tectum; Fig. 14, Dorsum of female; Fig. 15, Chelicera of female.
D. C. Paratypes will be deposited in the following institutions: Oregon State College, Corvallis, Oregon; British Museum (Natural History), London England.

_Neparholaspis crispus_ (Willmann).


**Known distribution**: “cave near Radna, Carniola.”

**Dimensions**:
- Female: Length = 990 μ; width = 930 μ.
- Male: unknown.

_Neparholaspis marginipilis_ n. comb.


**Known distribution**: Singapore, at bottom of tree near the McRetchie Reservoir (collected by M. W. F. Tweedie).

**Dimensions**:
- Female: Length = 630-650 μ; width = 297-305 μ.
- Male: unknown.

Evans (1956) established the genus _Tricholaspis_ on the basis of two characters found in the type and only species, _T. marginipilis_: a thick covering of short setae on the lateral margins of the dorsal plate and on the lateral interscutal membrane, and free metasternal shields. Since _Neparholaspis evansi_ also has free metasternal shields, it may be that the degree of fusion of the metasternal elements with adjacent shields, or the lack of it, is only of specific importance in the genus. A similar situation exists in other genera in the _Parholaspidae_, as will be shown later in this paper. Thus, the setation of the dorsum appears to be the only primary difference between _marginipilis_ and the species comprising the genus _Neparholaspis_. This variation probably is of insufficient importance to justify the retention of the genus _Tricholaspis_.

_Species incertae sedis._

*Parholaspis caelebs* Vitzthum.


**Distribution**: Java, in soil at Tjibodas.
Dimensions:
Female: unknown.
Male: Length = 695 μ; width = 445 μ.

The author follows Evans (1956 a) in placing this species provisionally in the genus Neperholaspis.

Genus Calholaspis Berlese.


Dorsal shield with several pairs of long simple setae. Metasternal shields fused to sternal shield. Peritrematal and ventri-anal shields not fused. Ventri-anal shield with more than four pairs of pre-anal setae. Tectum produced into a long median spine. Free-living in humus and litter.

Type: Calholaspis superbus Berlese.

Key to species of Calholaspis.

1. Ventri-anal shield with six pairs of pre-anal setae; tarsus II with stout spurs apically ...................................................... Calholaspis superbus Berlese
   — Ventri-anal shield with eight pairs of pre-anal setae; without stout spurs on distal portion of tarsus II. ......................... Calholaspis berlesei n. sp.

Calholaspis superbus Berlese.


Distribution: United States, in humus, Columbia.

Dimensions:
Female: Length = 1000 μ; width = 600 μ.
Male: unknown.

Calholaspis berlesei n. sp.

Female (figs. 13-16). — Length of idiosoma = 692 μ; width of venter at coxae IV = 355 μ. Dorsal shield with considerably more than thirty pairs of long simple setae; with at least twenty pairs of lateral and posterior marginal setae, of a length equal to that of the other dorsal setae; dorsal shield strongly reticulate and punctate. Tritosternum bipartite distally; with plumose lacinae and an elongate base. With a pair of narrow pre-sternal shields flanking the tritosternum. Sternal shield strongly and evenly reticulate (fig. 16), elongate and narrow, extending posteriorly to the anterolateral angles of coxae IV; fused late-
Fig. 16. — *Calholaspis berlesei* n. sp. Venter of female.

Figs. 17-19. — *Neoparholaspis coalescens* n. sp.

Fig. 17. Femur, genu and tibia II of male; Fig. 18, Chelicera of female;
Fig. 19, Dorsum and tectum of female.
rally to podal and peritrematal shields; sternal setae long, simple, and inserted in two nearly straight lines; sternal pores as illustrated. **Metasternal shields** fused to posterolateral angles of sternal shield; metasternal setae similar to sternals; metasternal pores on shield. **Epigynial shield** considerably broader than long, ornamented in a manner similar to that of the sternal shield; with a pair of setae inserted somewhat anterior to the posterolateral corners; perigenital rim present. Ventri-anal shield large, sub-triangular, and strongly reticulate and punctate, its anterior margin extending beneath the posterior margin of the epigynial shield; with eight pairs of pre-anal setae. Expulsory vesicles absent. **Stigma** located between and laterad of coxae III-IV; peritremes extending anteriorly beyond coxae I; peritrematal shield fused to podal and sternal elements. **Metapodal shields** absent. **Palpi** 5-segmented, with simple setae; empodial element of palpial claw indistinct but possibly spatulate distally. Movable digit of chelicera slightly longer than corniculi; with nine small and two large teeth; distal point strongly incurved; subdentate basally; with a setal brush and a setal corona net at its base (fig. 15). Fixed digit strongly toothed; dorsal seta simple. **Tectum** (fig. 13) with an elongate distally pointed median projection. **Legs** II-IV each with well-developed caruncle and claws; without stout spines on tarsi; legs I without claws.

**Male.** — unknown.

**Type material.** — A single holotype female with the following data: from *Fagus* litter, Bowie, Maryland; June 18, 1958 (collected by H. HURLBUTT). The specimen will be deposited in the collection of the U. S. National Museum, Washington, D. C.

**Genus Gamasholaspis** Berlese.


**Type:** *Holostaspis* (*Gamasholaspis*) *gamasoides* Berl.

Other generic characters are listed by EVANS (1956 a). The following key to the two known species is that given by EVANS in the above mentioned paper.

**Key to species of *Gamasholaspis***.

1. Anterior margin of the ventri-anal shield deeply emarginate to accomodate posterior portion of the genital shield; fused podal-peritrematal shields not flanking
the ventri-anal shield; apical seta on palptarsus about one-third the greatest length of the segment. 

Gamasholaspis gamasoides Berl.
— Anterior margin of the ventri-anal shield truncated; fused podal-peritrematal shields flanking the anterior region of the ventri-anal shield; apical seta on palptarsus minute, subspinose, about one-sixth the greatest length of the segment.

Gamasholaspis intermedius n. sp."

Gamasholaspis gamasoides Berlese.


Known distribution: Italy, in decaying vegetable matter; Argentina, from decaying vegetable matter in Avellaneda Park, Tucuman City (collected by P. Wygodzynsky).

Dimensions:
- Female: Length of dorsal shield = 638 μ; width = 308 μ.
- Male: Length = 700 μ; width = 390 μ.

Gamasholaspis intermedius Evans.


Known distribution: Sumatra, from forest litter at Parbuluan, south of Sidikalang (collected by A. H. G. Alston).

Dimensions:
- Female: Length = 720-730 μ; width = 440-450 μ.

Genus Parholaspis Berlese.


Dorsal shield with thirty pairs of setae; M₃ short, spine-like, all the rest of the dorsal setae broadly lanceolate. Anterior edge of dorsal shield gently rounded. Metasternal shields free. Epigynial shield not fused to podal or ventri-anal shields. Ventri-anal shield with four pairs of pre-anal setae. Movable digit of chelicera longer than corniculi. Dorsal seta of fixed digit simple. Male with holoventral shield and a spermatophoral process on the movable cheliceral digit. Free-living in decaying vegetable material.

Type: Parholaspis desertus Berl.

Other generic characters are given by Evans (1956 a). The two known species of Parholaspis may be separated through the use of the following key, taken from Evans.

Key to species of *Parholaspis*.

1. Prae-endopodal shields present; sternal shield punctated; two pairs of preanal setae simple .................................. *Parholaspis desertus* Berl.
2. Prae-endopodal shields absent; sternal shield with network of ridges; all preanal setae lanceolate .................................. *Parholaspis kewensis* n. sp.

*Parholaspis desertus* Berlese.


*Known distribution*: Java, Samarang (Berlese 1918); Singapore, from “roots of tree”, Nee Soon Reservoir (collected by M. W. F. Tweedie); Malaya, forest litter and topsoil, Sungei Buloh, Selangor (collected by J. R. Audy).

*Dimensions* :

- Female : Length = 825 μ; width = 460 μ.
- Male : Length = 700 μ; width 450 μ.

*Parholaspis kewensis* Evans.


*Known distribution*: England, from fallen fruits of *Caryota mitis* in the Aroid House, Royal Botanic Gardens, Kew (collected by P. N. Lawrence).

*Dimensions* :

- Female : Length = 1010 μ; width = 660 μ.
- Male : unknown.

**Genus Neoparholaspulus** nov.

Dorsal shield with twenty-nine, thirty, or thirty-one pairs of simple setae. Extramarginal setae normal for the family. Setae D₁ and M₁ inserted in a transverse row across the truncate anterior edge of the dorsal shield. Female with sternal shield bearing three pairs of setae. Metasternal shields free. Epigynial shield fused or coalesced with ventri-anal shield. Ventri-anal portion of geniti-ventri-anal shield with three pairs of pre-anal setae. Fused podal-peritrematal shield free from ventri-anal elements. Pre-sternal shields fragmented in both sexes. Movable digit of the chelicera equal to, or longer than, the corniculi; movable digit bidentate; dorsal seta on fixed cheliceral digit simple. Male with holoventral shield; genital orifice presternal; movable cheliceral digit with spermatoophoral process. Tectum with lateral elongate projections, in addition to

Type: Neoparholaspulus coalescens n. sp.

Key to species of Neoparholaspulus.

1. Ventri-anal and epigynial portions of geniti-ventri-anal shield joined by a strong, nearly transverse suture; ventri-anal portion reticulate but not punctate; peritremes extending anteriorly beyond M₁ on dorsum. Neoparholaspulus bakeri n. sp.

- Without a suture, or with an indistinct line of juncture between genital and ventri-anal portions (fig. 25); ventri-anal portion of geniti-ventri-anal shield punctate- reticulate; peritremes not extending anteriorly beyond M₁. Neoparholaspulus coalescens n. sp.

2. Peritreme extending anteriorly only to a point between coxae I-II, not reflected dorsally; portion of sternal shield posterior to sternal setae III without ornamentation; idiosoma of female over 550µ in length. Neoparholaspulus coalescens n. sp.

- Peritreme extending anteriorly to dorsal shoulders; sternal shield ornamented throughout; idiosoma of female less than 550µ in length. Neoparholaspulus cuspidatus n. sp.

3. Sternal shield with even punctate- reticulate pattern; with twelve evenly fragmented pre-sternal platelets; podal-peritrematal shield with a posterior projection, or cusp. Neoparholaspulus hurlihuti n. sp.

- Sternal shield pattern as illustrated (fig. 27); with unevenly fragmented pre-sternal platelets; podal-peritrematal shield evenly rounded posteriorly. Neoparholaspulus coalescens n. sp.

Neoparholaspulus coalescens n. sp.

Female (figs. 18-20). — Length of idiosoma = 621-639 µ; length of dorsal shield averages 586 µ; width of venter at coxae IV = 313-330 µ. Dorsal shield with twenty-nine pairs of simple setae; shield punctate medially, reticulate laterally and posteriorly. Tritosternum bipartite; tritosternal base at least 1/3 the total length of the tritosternum; lacinae strongly plumose. Pre-sternal shields fragmented into twelve narrow platelets flanking the tritosternal base. Sternal shield distinctly reticulated except on the portion posterior to sternal setae III; sternal setae and pores as illustrated. Metasternal shields free, lying behind the posterolateral angles of the sternal shield. Epigynial shield completely fused posteriorly to ventrianal shield, the entire structure being strongly reticulate; ventri-anal portion with three pairs of pre-anal setae. Stigma located between and laterad of coxae III-IV; peritreme extending anteriorly to a point between coxae I-II; peritrematal shields fused to exopodal shields. Metapodal shields narrow, elongate and placed as illustrated. Palpi typical for the family; with distally spatulate empodial element on the palpal claw. Movable digit of chelicera (fig. 18) of a length similar to that of the corniculi; bidentate. Dorsal seta at base of fixed digit simple. Tectum (fig. 19) with distally divided lateral projections. Legs II-IV with caruncles and claws; femur IV without spur; legs I with claws.
Figs. 20-21. — *Neoparholaspulus coalescens* n. sp.
Fig. 20, Venter of female; Fig. 21, Chelicera of male.

Figs. 22-23. — *Neoparholaspulus bakeri* n. sp.
Fig. 22, Chelicera of female; Fig. 23, Venter of female.
Male (figs. 17, 21). — Length of idiosoma = 515-550 μ; width of venter at coxae IV = 221-248 μ. Dorsum similar to that of female. Pre-ternal shields fragmented around genital orifice. With holoventral shield strongly reticulated only at the anterior and lateral margins, and on the ventri-anal portions. Movable digit of chelicera (fig. 21) with a spermatophoral process. Tectum similar to that of female. Leg II (fig. 17) spurred in typical fashion; legs I with claws.

Type material. — Four males and four females, from the following locality: Louisiana, near Franklin, winter-spring, 1954, in soil around sugarcane roots (collected by L. D. Newsom). The specimens also carry the following identification — U. S. National Museum Lot 57-2512. Holotype female and allotype male will be deposited in the collection of the U. S. National Museum, Washington, D. C. Paratypes will be deposited in the following institutions: Oregon State College, Corvallis; British Museum (Natural History), London, England.

Fig. 24. — Neoparholaspis bakeri n. sp. Dorsum and tectum of female. Fig. 25. — Neoparholaspis cuspidatus n. sp. Venter of female.
Neoparholaspulus bakeri n. sp.

Female (figs. 22-24). — Length of idiosoma = 490-495 μ; width of venter at coxae IV = 215-231 μ. Dorsal shield weakly reticulated; with thirty-one pairs of simple setae, the more posterior pairs distally serpentine (fig. 24). Tritosternalum with long plumose lacinae; tritosternal base short, broad proximally. Pre-sternal shields fragmented into fourteen uneven platelets. Sternal shield reticulate and weakly punctate throughout; sternal setae and pores as illustrated. Metasternal shields free, located behind the posterolateral angles of the sternal shield. Epigynial and ventri-anal shields coalesced but with a nearly transverse suture between them; epigynial portion reticulate-punctate; ventri-anal portion without punctations and with three pairs of pre-anal setae inserted in two nearly straight lines. Stigma opposite the anterior edge of coxa IV; peritreme extending anteriorly around coxa I and along the anterior edge of the dorsal shield to a point between D1 and M1; peritrematal and podal shields fused. Metapodal shields present. Posterior marginal setae distally serpentine. Palpi 5-segmented, typical for the family; empodial element of palpal claw spatulate distally. Movable digit of chelicera (fig. 22) bidentate, equal in length to the corniculi; dorsal seta at base of fixed cheliceral digit simple. Tectum (fig. 24) with pronounced median extension; with five or six short spines on either side of the median projection, and a pair of elongate lateral extensions. Legs II-IV with caruncles and claws; with a series of strong spines on the distal portion of tarsus II; legs I with claws.

Male. — unknown.

Type material. — Two females from peach orchard soil, Union County, Illinois, September 16, 1936 (collected by F. W. Turner). Additional data are as follows: T-856c, Lot 37-2482, U. S. National Museum. Holotype female will be deposited in the collection of the U. S. National Museum, Washington, D. C. Paratype female will be deposited in the collection at Oregon State College, Corvallis, Oregon.

Neoparholaspulus cuspidatus n. sp.

Female (fig. 25). — Length of idiosoma = 511 μ; width of venter at coxae IV = 234μ. Dorsal shield distinctly reticulate; setal arrangement and number indistinct. Tritosternal base long, equal in length to the distance between sternal setae II and III; lacinae plumose. Pre-sternal shields evenly fragmented into twelve platelets which flank the tritosternal base. Sternal shield with well defined punctate-reticulate pattern; sternal setae and pores as illustrated. Metasternal shields free, elongate, located behind the posterolateral angles of the sternal shield. Epigynial and ventri-anal shields fused; ventri-anal portion with three pairs of pre-anal setae; geniti-ventri-anal shield uniformly ornamented. Stigma between coxae III-IV; peritreme extending anteriorly to the anterolateral shoulders
of the dorsal shield; peritrematal and podal shields fused, posteriorly with a small acuminate cusp. Metapodal shields not seen. Palpi typical for family; empodial element of palpal claw indistinct. Movable cheliceral digit bidentate, equal in length to corniculi; dorsal seta on fixed digit simple. Tectum with distally spinose median extension and typical lateral projections. Legs I with weak claws; coxae I with short spurs internally; legs II-IV with caruncles and claws.

Male. — unknown.

Type material. — A single female specimen with the following collection data: from peach orchard soil, Howard County, Arkansas, June 8, 1936 (collected by W. F. Turner). Additional data — T77, Lot 36-20984, U. S. National Museum. Holotype female will be deposited in the collection of the U. S. National Museum, Washington, D. C.

Neoparholaspulus hurbutti n. sp.

Female (figs. 26-28). — Length of idiosoma = 440-469 μ; length of the dorsal shield = 410 μ; width of the venter at coxae IV = 231-235 μ. Dorsal shield weakly punctate-reticulate and with twenty-nine pairs of long simple setae; muscle attachment pattern distinct (fig. 28). Tritosternal base elongate, not as long as the distance between sternal setae II and III; lacinae plumose. Each pre-sternal shield unevenly fragmented, broken up into four to six platelets, and varying between sides on a single specimen. Sternal shield with a strong reticulate pattern anteriorly and anterolaterally; distinctly punctate throughout; sternal setae long, simple. Metasternal shields free, circular, and each with a long seta and a pore; located behind the posterolateral angles of the sternal shield. Epigynial and ventri-anal shields fused; uniformly punctate-reticulate; ventri-anal portion with three pairs of pre-anal setae. Stigmata opposite anterior angles of coxae IV; peritremes extending anterodorsally to the middle of coxae I; peritrematal and podal shields fused; without a posterior cusp on podal-peritrematal shield. Metapodal shields distinct, elliptical in shape and located laterad of the ventri-anal portion of the geniti-ventri-anal shield. Palpi typical for family; empodial element of palpal claw indistinct. Movable digit of chelicera (fig. 26) equal in length to corniculi, bidentate; dorsal seta simple. Median extension of tectum divided distally; lateral projections present. Legs II-IV with caruncles and claws; coxae I without short internal spurs; without claws on legs I.

Male. — unknown.

Type material. — Two females with the following data: Holotype female from Fagus litter, Bowie, Maryland — Patuxent refuge, June 18, 1958 (collected by H. Hurbutti); paratype female with the same data, but collected on June 20, 1958. Holotype female will be deposited in the collection of the U. S. National Museum, Washington, D. C. The paratype female will remain in the collection at Oregon State College, Corvallis, Oregon.
Figs. 26-28. — Neoparholaspulus huributi n. sp.
Fig. 26, Chelicera of female; Fig. 27, Venter of female;
Fig. 28, Dorsum and tectum of female.

Figs. 29-30. — Parholaspulus trägårðhi n. sp.
Fig. 29, Tectum of female; Fig. 30, Chelicera of female.
Genus *Parholaspulus* Evans.


Dorsal shield with thirty pairs of simple setae. Extramarginal setae normal for family. Setae $D_1$ and $M_1$ inserted transversely across the anterior edge of the dorsal shields as in *Neoparholaspulus*. Anterior margin truncate or slightly concave. Sternal shield of female with three pairs of setae; shield variously ornamented. Metasternal shields free in the integument or fused to endopodals III. Epigynial shield not fused to ventri-anal shield. Ventri-anal shield triangular or with the anterolateral corners reduced; with three pairs of pre-anal setae. Podal and peritrematal shields fused. Pre-ternal shields fragmented into platelets or comprising only two shields. Movable digit of the chelicera of a length similar to that of the corniculi; number of teeth on movable digit variable. Males with a holoventral shield; genital orifice pre-ternal; movable cheliceral digit with a spermatophoral process. Tectum with lateral elongate projections in addition to the median extension. Femur IV of female commonly with a strong spur. Leg II of male spurred. Free-living in forest litter, leaf mold and soil.

*Type:* *Parholaspulus alstoni* EVANS.

**Key to species of *Parholaspulus***.

1. Movable digit of chelicera with only two teeth; with a fragmented pre-ternal shield consisting of fourteen small platelets............ *Parholaspulus alstoni* EVANS
   — Movable digit of chelicera with more than ten teeth; with a single pair of pre-ternal shields ........................................ 2.

2. Peritreme extending anteriorly beyond coxae II; tectum with a series of long smooth spines, in addition to the typical lateral extensions; spur on femur IV small, knob-like ......................... *Parholaspulus parvibatus* n. sp.
   — Peritreme not extending beyond coxae II; tectum lacking long secondary spines; spur on femur IV not as above............................ 3.

3. Ventri-anal shield triangular; sternal shield with strong reticulation anteriorly; spur on femur IV broad, rounded, sometimes divided distally (fig. 31)..........
   — Ventri-anal shield with anterolateral angles reduced; sternal shield weakly punctate; spur on femur IV elongated; knobbed or truncate distally.................... *Parholaspulus lobatus* n. sp.

*Parholaspulus alstoni* EVANS.


*Known distribution*: England, from soil in No. 3 Fern House, Royal Botanic Gardens, Kew (collected by A. H. G. ALSTON); Belgium, in soil around heather plant intercepted at Philadelphia, Pennsylvania, October 21, 1950 (collected by
L. McConnell); Germany, on Sedum, Asparagus, and Agave plants intercepted at New York, New York, January 29, 1954 (collected by Uhl and Kuhn); Germany, in soil around Araucaria intercepted at New York, New York, March 4, 1954 (collected by D. Linehan).

Dimensions:

Female: Length = 550-624 μ; length of dorsal shield = 532 μ; width = 275-300 μ.
Male: Length = 530 μ; width = 255 μ.

Parholaspulus parvilobatus n. sp.

Female (figs. 37-38). — Length of dorsal shield = 717 μ; width of venter at coxae IV = 314 μ. Dorsal shield with thirty pairs of long setae; shield densely punctate and showing a distinct muscle attachment pattern; anterior margin truncate. Tritosternum (fig. 38) with base longer than the distance between sternal setae II and III; lacinae somewhat longer than base, plumose. With a pair of pre-sternal shields flanking the tritosternal base. Sternal shield evenly reticulate and punctate; with three pairs of long sternal setae; sternal pores as illustrated. Metasternal shields fused to endopodals III; metasternal setae similar to those of sternal shield; metasternal pores distinct. Epigynial shield with straight lateral margins; base of shield wider than anterior margin; truncate posteriorly, ornamented as illustrated; genital setae anterior to posterolateral corners. Ventr-anal shield sub-triangular, the anterior margin slightly concave and the anterolateral corners rounded; with punctate pattern and three pairs of long pre-anal setae in addition to the adanal and postanal setae; ventri-anal shield free from podal-peritrematal shield. Metapodal shields elongate, lateral of pre-anals II. Stigma between coxae III-IV; peritreme extending anteriorly to the anterior edge of coxae II. Palpi with 5 free segments; empodial element of palpal claw spatulate distally. Movable digit of chelicera with two large and twelve or thirteen small retrorse teeth; somewhat longer than corniculi; dorsal seta on fixed cheliceral digit wide at its base and acuminate distally. Tectum (fig. 37) with median extension divided distally; with large spines on either side of the median extension, as well as the lateral projections typical for the genus. Legs II-IV with caruncles and claws; femur IV with a small knob-like spur ventrally; legs I without claws.

Male. — unknown.

Type material. — A single female specimen with the following data: from fir treehole, 20 miles southwest of Philomath, Oregon, May 9, 1959 (collected by G. W. Krantz). The holotype female will be deposited in the collection of the U. S. National Museum, Washington, D. C.
Parholaspulus trágárdhi n. sp.

**Female** (figs. 29-32). — Length of idiosoma = 604-610 μ; length of dorsal shield averages 582 μ; width of venter at coxae IV = 281-326 μ. **Dorsal shield** (fig. 32) punctate, with thirty pairs of long simple setae; muscle attachment pattern vague; anterior margin truncate. **Tritosternum** with base longer than distance between sternal setae II and III; lacinae considerable longer than base; plumose. With a single pair of pre-ternal shields flanking the tritosternum. **Sternal shield** ornamented as illustrated (fig. 31); with three pairs of setae and associated pores. **Metasternal shields** fused to endopodals III, as in *P. parvilobatus*. **Epigynial shield** truncate posteriorly, not fused to ventri-anal shield; genital setae inserted nearly 1/4 the total length of the shield from the posterior margin; ornamented in a manner similar to that of sternal shield. **Ventre-anal shield** triangular, punctate and weakly reticulate; with three pairs of long pre-anal setae. **Metapodal shields** distinct, located laterad of pre-anals II. **Stigma** between coxae III-IV; peritremes variable in length but extending anteriorly only to posterior margins of coxae II; peritrematal and podal shields fused. **Palpi normal for family**; empodial element of palpal claw spatulate distally. Movible digit of chelicera with two large and 12-13 small teeth (fig. 30); somewhat longer than corniculi; dorsal seta on fixed digit simple. **Tectum** with distally divided median extension and typical lateral projections (fig. 29). **Legs** II-IV with caruncles and claws; femur IV with a broad, rounded, sometimes distally divided spur ventrally; legs I without claws.

**Male.** — unknown.

**Type material.** — Eight females, bearing the following information: **Holotype female** from *Pinus contorta* litter, 2 miles north of Waldport, Oregon, February 1, 1959 (collected by J. D. LATTIN); one paratype female from the same locality; two females from leaf mold, 5 miles north of Rhododendron, Oregon, February 22, 1942 (collected by J. C. CHAMBERLIN); one female from cedar stump, 15 miles southeast of Oakridge, Oregon, April 18, 1959 (collected by G. F. KRAFT); one female from Douglas fir litter (2300'), 6.5 miles south-east of Valsetz, Polk Co., Oregon, March 8, 1959 (collected by J. D. LATTIN); two females from Douglas fir litter, Blodgett, Oregon, March 26, 1959 (collected by B. D. AINSCOUGH). The **holotype** and one **paratype** female will be deposited in the collection of the U. S. National Museum, Washington, D. C. Paratypes will be deposited in the following institutions: Oregon State College, Corvallis, Oregon; British Museum (Natural History), London, England.

**Parholaspulus lobatus** n. sp.

**Female** (figs. 33-36). — Length of idiosoma = 605-639 μ; length of dorsal shield averages 594 μ; width of venter at coxae IV = 284-319 μ. **Dorsal shield**
Figs. 31-32. — Parholaspulus trågårdhi n. sp.
Fig. 31, Venter of female; Fig. 32, Dorsum of female.

Figs. 33-34. — Parholaspulus lobatus n. sp.
Fig. 33, Dorsum of female; Fig. 34, Venter of female.
(fig. 33) weakly ornamented; with thirty pairs of setae, many of which are long and whiplike; anterior margin of shield truncate. *Trilosternum* (fig. 34) with base longer than the distance between sternal setae II and III; lacinae plumose, longer than tritosternal base. With a single pair of narrow *pre-ster nal shields* flanking the tritosternum. *Sternal shield* reticulate only along the anterior and lateral margins; weakly punctate medially and posteriorly; with three pairs of long sternal setae; sternal pores as illustrated. *Metasternal shields* fused to endopodals III, as in *P. trægårdæhi*. *Epigynial shield* punctate; posterior and posterolateral margins forming a slight convexity. *Venti-anal shield* not fused to epigynial or peritrematal elements; anterolateral angles reduced; shield weakly punctate but not reticulate; with three pairs of long pre-anal setae. *Metapodal shields* distinct and placed as illustrated. *Stigmata* between coxae III-IV; peritremes never extending anteriorly beyond the posterior edge of coxae II; podal and peritrematal shields fused. *Palpi* normal; palpal claw with empodial element spatulate distally. Movable digit of *chelicera* (fig. 36) with two large and fourteen small retrorse teeth; dorsal seta on fixed cheliceral digit simple; movable cheliceral digit and corniculi of approximately equal length. *Tectum* (fig. 35) with median projection, spinose anterior margin, and a pair of lateral extensions. *Legs* II-IV with caruncles and claws; femur IV with an elongate spur which may be knobbed or truncate distally; legs I without claws.

**Male.** — unknown.

**Type material.** — Six females with the following data: *Holotype* and three *paratype* females from Noble fir litter, 20 miles southwest of Philomath, Oregon, May 9, 1958 (collected by B. D. AINSCOUGH); one female from a fir treehole at the same locality and collected on the same date (by G. W. KRANTZ); one female from the same host material and locality as the *holotype* but collected on June 27, 1958 (by B. D. AINSCOUGH). The *holotype* and one *paratype* female will be deposited in the collection of the U. S. National Museum, Washington, D. C. Paratype material will be deposited in the following institutions: Oregon State College, Corvallis, Oregon; British Museum (Natural History), London, England.

The genus *Neoparholaspulus* has been separated from *Parholaspulus* primarily on the basis of the fused condition of the epigynial and ventri-anal shields in *Neoparholaspulus*. The importance of this character, however, may be open to question. In light of the shield condition of *N. bakeri*, in which the ventri-anal and epigynial portions of the geniti-ventri-anal shield are fused but separated by a distinct suture (fig. 23), it is conceivable that the fused condition is variable within the genus. The distinct separation of *Parholaspulus alstoni* from the other described species of the genus on the basis of the number of cheliceral teeth, the pre-ster nal shields, and the condition of femur IV, and the strong similarities between *alstoni* and the species of the genus *Neoparholaspulus*, may indicate that another type of separation would be more satisfactory. Considering the fragmented sternal shield, the bidentate movable cheliceral digit, and the presence
Figs. 35-36. — Parholaspilus lobatus n. sp.
Fig. 35. Dorsum of gnathosoma of female with chelicerae removed; Fig. 36, Chelicera of female.

Figs. 37-38. — Parholaspilus parvilobatus n. sp.
Fig. 37, Tectum of female; Fig. 38, Venter of female.
Fig. 39. — Lattinella capizzii n. sp. Venter of female.
of a spur on femur IV as primary generic characters, the species now considered
to be members of the genus *Neoloholaspus* would fall into the genus *Parholas-
pus*. Consequently the new species described as members of the genus *Parho-
laspus* would no longer be valid members of the genus. Perhaps future disco-
very of related species will help to clarify the relative importance of the characters
herein discussed. For the purposes of this study, the fused geniti-ventri-anal
condition is used as the basis of separation for these genera.

Genus **Lattinella** nov.

Dorsal shield apparently with thirty-one pairs of long simple setae. Pre-
sternal shields not fragmented. Female with sternal shield bearing three pairs
of setae. Metasternal shields fused to endopodals III. Epigynial shield free
from ventri-anal and podal-peritrematal shields; perigenital rim present. Ventri-
anal shield triangular; with three pairs of pre-anal setae. Metapodal shields
present. Movable digit of chelicera considerably shorter than corniculi; biden-
tate. Dorsal seta at base of fixed cheliceral digit simple. Tectum without elong-
gate lateral projections. Tarsi II-IV with caruncles and claws. Femur IV
without spur. Tarsi I with well-developed claws (fig. 43). Free-living in forest
litter.

*Type*: **Lattinella capizzi** n. sp. Monotypic.

**Lattinella capizzi** n. sp.

*Female* (figs. 39-43). — Length of idiosoma = 820-994 μ; width of venter at
coxae IV = 450-533 μ. With the characters of the genus. **Dorsal shield** (fig. 40)
strongly reticulate; anterior margin heavily sclerotized and carrying setae DI
and M1, and the distal exterminities of the peritremes. **Tritosternum** bipartite,
with base considerably longer than distance between sternal setae II and III;
lacinae plumose, somewhat longer than tritosternal base. **Sternal shield** strongly
ornamented in a distinct pattern (fig. 39); with three pairs of whip-like sternal
setae. **Metasternal** setae long, inserted on fused metasternal-endopodal elements
posterolateral of sternal shield. **Epigynial shield** broader than long; punctate-
reticulate and with a perigenital rim; epigynial setae inserted well forward of the
truncate posterior margin. **Vventri-anal shield** punctate-reticulate; pre-anal setae
long. **Stigmatea** between and laterad of coxae III-IV; peritremes extending ante-
riorly beyond coxae I and reflected dorsally to a point laterad of setae M1; peri-
trematal and podal elements fused around coxae. **Palpi** normal for the family;
empodial element of palpal claw spatulate distally. **Chelicerae** (fig. 41) as de-
scribed for the genus. **Tectum** (fig. 42) with a smooth median projection support-
ing a pair of smaller lateral elements. **Legs** as described for the genus.

*Male. —* unknown.
Type material. — Five females, with the following data: Holotype female from Douglas fir litter, 6 miles northwest of Copper, Jackson County, Oregon, April 21, 1958 (collected by R. F. Koontz); one paratype female from duff, Lane County, Oregon, August 5, 1958 (collected by J. Capizzi); one female from moss-straw

---

Figs. 40-43. — Lattinella capizzi n. sp.
Fig. 40, Dorsum of female; Fig. 41, Chelicera of female;
Fig. 42, Tectum and corniculi of female; Fig. 43, Tarsus I of female.
litter, 2.5 miles northeast of Summit, Benton County, Oregon, March 5, 1959 (collected by J. D. LATTIN); one female from Douglas fir litter, 2.5 miles east of Sweet Home, Oregon, August 28, 1958 (collected by J. D. LATTIN); one female from litter of Pinus contorta, 2 miles north of Waldport, Oregon, February 1, 1959 (collected by J. D. LATTIN). The holotype female will be deposited in the collection of the U. S. National Museum, Washington, D. C. Paratype females will be deposited in the collections of Oregon State College and the British Museum (Natural History), London, England.

Genus Parholaspella nov.

Dorsal shield with thirty pairs of simple or weakly spatulate setae. Pre-sternal shields not fragmented. Female with strongly reticulate sternal shield bearing three pairs of setae. Metasternal shields fused to endopodals III. Epigynial shield not fused to ventri-anal or podal-peritrematal shields. Ventri-anal shield triangular or sub-triangular; with three or four pairs of pre-anal setae. Metapodial shields present. Movable digit of chelicera approximately equal in length to, or longer than, corniculi; dorsal seta of fixed cheliceral digit simple. Males with holoventral shield; genital orifice pre-sternal. Movable digit of male chelicera with a spermatophoral process; femur, genu, and tibia II spurred. Tectum without elongate lateral projections. Tarsi II-IV with caruncles and claws. Femur IV with or without spur. Tarsi I of female with no claws; males with weak claws on tarsi I.

Type: Parholaspella spatulata n. sp.

Key to species of Parholaspella.

1. With four pairs of pre-anal setae
   — With three pairs of pre-anal setae

2. Movable digit of chelicera with sixteen teeth; dorsal setae simple; femur IV with spur
   Parholaspella petiata n. sp.

   — Movable digit of chelicera with ten or eleven teeth; dorsal setae distally spatulate; without spur on femur IV
   Parholaspella spatulata n. sp.

Parholaspella spatulata n. sp.

Female (figs. 44-47). — Length of idiosoma = 710-816 \( \mu \); width of venter at coxae IV = 390-426 \( \mu \). Dorsal shield punctate-reticulate, ornamented with distinct muscle attachment areas; with thirty pairs of setae which are weakly spatulate distally; anterior margin of the shield slightly concave and bearing the distal extremities of the peritremes. Tritosternum with base longer than the distance between sternal setae II and III; lacinae longer than base, plumose. With a pair of narrow pre-sternal shields flanking the tritosternum. Sternal shield with

an arch-like sclerotic line which is distinct in a strongly reticulate-punctate pattern (fig. 44); with three pairs of sternal setae. *Epigynial shield* strongly ornamented, truncate posteriorly and free of ventri-anal and podal-peritrematal fusions; with a pair of epigynial setae inserted laterally and forward of the posterior edge; with

---

Figs. 44-48. *Parholaspella spatulata* n. sp.
Fig. 44, Venter of female; Fig. 45, Dorsum of female; Fig. 46, Chelicera of female; Fig. 47, Dorsum of gnathosoma of female with chelicerae removed; Fig. 48, Chelicera of male.
a perigenital rim. Ventri-anal shield triangular, punctate-reticulate, and with three pairs of pre-anal setae. All ventral setae simple. Stigmata between coxae III-IV; peritremes extending anteriorly beyond coxae I and terminating medially of dorsal setae D1. Palpi simple; empodial element of palpal claw spatulate distally. Movable digit of chelicera (fig. 46) as long or longer than corniculi; with two large and eight or nine small internal teeth; dorsal seta on fixed cheliceral digit simple. Tectum (fig. 47) with a distally divided median projection and spinose anterior margins. Leg II-IV with several strongly curved setae; no spur present on femur IV; claws on legs I absent.

**Male** (fig. 48). — Length of idiosoma = 624-635 μ; width of venter at coxae IV = 390-400 μ. Dorsal shield similar to that of female, except that the setae are not clearly spatulate distally. Sternal portion of holoventral shield ornamented as in female; genital orifice posterior to pre-sternal shields. Peritremes terminating in posteriorly oriented loops just medially of setae M1. Movable digit of chelicera (fig. 48) with spermatophoral process nearly as long as the digit itself. Femur, genu, and tibia II spurred ventrally. Legs I with weak claws.

**Type material.** — Six females and two males, with collecting data as follows: Holotype female from Thuja litter, Washington County, Oregon, 1941 (collected by J. C. Chamberlin); allotype male from moss and litter, 10 miles northwest of Forest Grove, Oregon, October 5, 1957 (collected by C. D. Jorgensen); two paratype females from the same collection as the holotype; one paratype female from the same collection as the allotype; one female from a fir treehole, 5 miles south of Colton, Oregon, June 3, 1959 (collected by G. W. Krantz); one female from alder leaf mold, near Mill City, Oregon, September 28, 1941 (collected by J. C. Chamberlin), and one male paratype from the same collection. The holotype female and allotype male will be deposited in the collection of the U.S. National Museum, Washington, D. C. Paratypes will be deposited in the following institutions: Oregon State College, Corvallis, Oregon; British Museum (Natural History), London, England.

**Parholaspella womersleyi** n. sp.

**Female** (figs. 49-52). — Length of idiosoma = 866 μ; width of venter at coxae IV = 462-494 μ. Dorsal shield (fig. 52) heavily sclerotized; punctate medially, reticulate laterally; dorsal setae simple. Tritosternum with base as in P. spatulata; laciniae plumose. With a pair of pre-sternal shields which abut the tritosternal base. Sternal shield (fig. 49) with arch-like design as in spatulata; ornamentation heavy. Sternal and metasternal setae simple. Epigynial shield with lateral margins straight; wider at posterior than at anterior margin; perigenital rim present; epigynial setae as in spatulata. Ventri-anal shield triangular; with four pairs of pre-anal setae; anal setae posterior to anal opening. Stigmata between coxae III-IV; peritremes extending anteriorly beyond coxae I and
Figs. 49-52. — *Parholaspella womersleyi* n. sp.

Fig. 49, Ventre of female; Fig. 50, Tectum of female; Fig. 51, Chelicera of female; Fig. 52, Dorsum of female.
reflected dorsally, terminating laterad of M; podal and peritrematal shields fused. Palpi typical for family; palpal claw with distally spatulate empodial element. Movable digit of chelicera (fig. 51) considerably longer than corniculi; with two large and nine or ten small internal teeth; dorsal seta on fixed digit simple. Tectum (fig. 50) with distally divided median projection and a spinose anterior margin. Legs II-IV with several strongly curved setae; without a spur on femur IV; without claws on legs I.

Male. — unknown.

Type material. — Three females from a fir treehole, 20 miles southwest of Philomath, Oregon, May 9, 1958 (collected by G. W. Krantz). The holotype female will be deposited in the collection of the U. S. National Museum, Washington, D. C. Paratype females will be placed in the collections of the British Museum (Natural History), London, England, and Oregon State College, Corvallis, Oregon.

Parholaspella peltata n. sp.

Female (figs. 53-56). — Length of idiosoma = 760 \( \mu \); length of dorsal shield = 724 \( \mu \); width of the venter at coxae IV = 362 \( \mu \). Dorsal shield (fig. 56) punctate throughout but reticulate only laterally; muscle attachment patterns distinct; dorsal setae simple; anterior margin of shield slightly convex. Triosternum and pre-sternal shields as in P. womersleyi and P. spatulata. Sternal shield (fig. 53) with a strong punctate-reticulate pattern; archlike sclerotized line absent or obscure; sternal setae simple. Metasternal shields fused to endopodals III. Epigynial shield nearly rectangular, slightly longer than wide, and distinctly sculptured; epigynial setae inserted forward of the truncate posterior margin. Ventral shield sub-triangular; anterolateral corners reduced; anterior margin fused intermittently with podal-peritrematal shields; surface of shield with a weak punctate pattern; with three pairs of pre-anal setae. Sigmata opposite the anterior angles of coxae IV; peritremes extending anteriorly to the anterior angles of coxae II. Palpi with the normal five free segments; empodial element of palpal claw spatulate distally. Movable digit of chelicera (fig. 55) with two large and thirteen small internal teeth; slightly longer than corniculi; dorsal seta on fixed cheliceral digit simple. Tectum (fig. 54) with median projection and spinose anterior margin. Legs II-IV without strongly curved setae; femur IV with a rounded spur ventrally; without claws on legs I.

Male. — unknown.

Type material. — A single female, with the following data; in litter from Pinus contorta, 2 miles north of Waldport, Oregon, February 1, 1959 (collected by J. D. Lattin). The holotype female will be deposited in the collection of the U. S. National Museum, Washington, D. C.
Fig. 53-56. — *Parkolaspella peltata* n. sp.
Fig. 53, Venter of female; Fig. 54, Tectum of female; Fig. 55, Chelicera of female; Fig. 56, Dorsum of female.
DISCUSSION.

It was mentioned earlier that the affinities of the Parholaspidae may lie with the Macrochelidae or with the Neoparasitidae. In addition to the structural resemblances between the Parholaspidae and the Neoparasitidae that were discussed in the introduction, various parholaspid genera are seen to have idiosomal sclerotization strongly reminiscent of typical neoparasitid types. For example, the genus *Neparholaspis* resembles several of the Gamasiphis-like genera in the Neoparasitidae, insofar as the ventral sclerotization is concerned. It should be apparent from the discussion of parholaspid species, however, that the sclerotization of the venter is highly variable. The range of variation, in fact, includes several species which closely parallel the ventral shield development of the Macrochelidae. Included in the latter are species of the genera *Parholaspis* and *Parholaspulus*. Thus, the use of ventral sclerotization as a means of inferring familial derivations in the above mentioned groups is not justifiable. Similarly, the presence or absence of claws on legs I in the Parholaspidae is an intrageneric variation in at least two genera (*Neparholaspis* and *Parholaspella*) and should not be considered as an indication of a close systematic relationship between the Parholaspidae and the Neoparasitidae.

![Dendrogram depicting possible relationships in the families Macrochelidae and Parholaspidae.](image-url)
The presence of one or two setal brushes at the base of the movable cheliceral digit in both the Parholaspidae and the Macrochelidae suggests, as noted in the introduction, a relationship between these two assemblages. The fact that this structure is not found in any other parasitoid groups adds credence to the suggestion.

Assuming, then, that the Parholaspidae and Macrochelidae are derived from some common ancestral stock, it is possible to construct a phylogenetic dendrogram outlining possible derivations of the various genera involved, based upon a series of morphological factors which are assumed to evolve from the primitive to a more advanced state. Evans (1956a) has constructed such a dendrogram, in which he figures the Macrochelidae and the Parholaspidae as subfamilies with common derivations. The dendrogram included herein (fig. 57) is a variation of that figured by Evans and is based upon the following suppositions:

1. The Parholaspidae and the Macrochelidae are derived from a common ancestor, possibly a Neoparasitus-like, or Gamasellus-like form.
2. The main line of evolution in the Parholaspidae is toward a more or less completely fused ventral shield condition.
3. The main line of evolution in the Macrochelidae is toward a weakly sclerotized venter, concomitant with a semi-parasitic or paraphagous existence.
4. Since the Macrochelidae appear to be evolving toward a parasitic or semi-parasitic existence, the family is considered to be an offshoot from the more primitive free-living parholaspid line.
5. The genus Geholaspis is the most primitive of the family Macrochelidae, having many characters in common with both the Parholaspidae and Macrochelidae. Inasmuch as it possesses looped peritremes and well-developed accessory sclerites, however, it appears to belong to the latter group.
6. The genus Calholaspis resembles Geholaspis in a number of features, but has straight peritremes and weak accessory sclerites. It also possesses both a setal brush and a coronet of setae at the base of the movable cheliceral digit. It is therefore considered to be the most primitive of the Parholaspidae.

**Summary.**

The subfamily Parholaspinae Evans 1956 is herein raised to the rank of family. A key to genera is provided, as well as keys to species. The following three genera are proposed: *Neoparholaspulus*, type *Neoparholaspulus coalescens* n. sp.; *Lattinella*, type *Lattinella capizzii* n. sp.; *Parholaspella*, type *Parholaspella spatulata* n. sp. In addition, the following new species are described:

*Neoparholaspis evansi* n. sp.
*Calholaspis berlesii* n. sp.
*Neoparholaspulus bakeri* n. sp.
*Neoparholaspulus cuspidatus* n. sp.
Neoparholaspulus hurlbutti n. sp.
Parholaspulus parvilobatus n. sp.
Parholaspulus trigardhi n. sp.
Parholaspulus lobatus n. sp.
Parholaspella womersleyi n. sp.
Parholaspella peltata n. sp.

The genus Tricholaspis Evans 1956 is herein considered to be synonymous with Neoparholaspis Evans 1956.

ACKNOWLEDGEMENTS.

The author wishes to express his thanks to G. O. Evans, British Museum (Natural History), London, for examining some of the specimens described in this paper, and to E. W. Baker, U. S. National Museum, Washington and H. W. Hurlbut, University of Maryland, College Park, for the loan of specimens. For aid in collecting local material, the author also is grateful to J. D. Lattin, Oregon State College, Corvallis, J. Capizzi, Oregon Department of Agriculture, Salem, and to the several other persons who contributed samples from which useful specimens were derived.

REFERENCES


