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Myrmecophyes oregonensis, a New Species of Halticini (Hemiptera, Miridae) from the Western United States

RANDALL T. SCHUH¹ AND JOHN D. LATTIN²

ABSTRACT

Myrmecophyes oregonensis (Hemiptera, Miridae, Orthotylinae, Halticini) is described as new from central and south central Oregon. This is the first record of the genus from the Western Hemisphere. Information is provided on the male and

female genitalia, femoral trichobothria, and pretarsus. This saltatorial antlike species apparently breeds on the native perennial bunch grass *Agropyron spicatum*.

INTRODUCTION

The present paper is the result of recent work in central and south central Oregon, where a single female mirid was found and which could not be placed in any genus previously known from North America. Subsequent collecting yielded numbers of males and females such that comparisons with previously described taxa were possible.

Mr. David Lightfoot made the initial capture in 1976, recognized the unusual nature of the specimen, and made special efforts to obtain additional material. Dr. Paul Oman provided valuable assistance in collecting the large series in 1978 and 1979. Dr. James Kamm made available vacuum sampler collections taken at the type locality in 1974 by Mr. James Todd that contained adults and

nymphs. Messrs. Michael Schwartz and Gary Stonedahl collected material from two additional localities. We thank Ms. Bonnie Hall for the dorsal view drawings, Ms. Kathleen Schmidt for the line drawings and Ms. Brenda M. Massie for help with the preparation of the manuscript. The Oregon State University General Research Fund provided funds for the dorsal view drawings.

Abbreviations in the locality data are: American Museum of Natural History (AMNH); California Academy of Sciences (CAS); Zoological Institute, Leningrad (LM); Oregon State University Systematic Entomology Laboratory (OSU); National Museum of Natural History, Smithsonian Institution (USNM).

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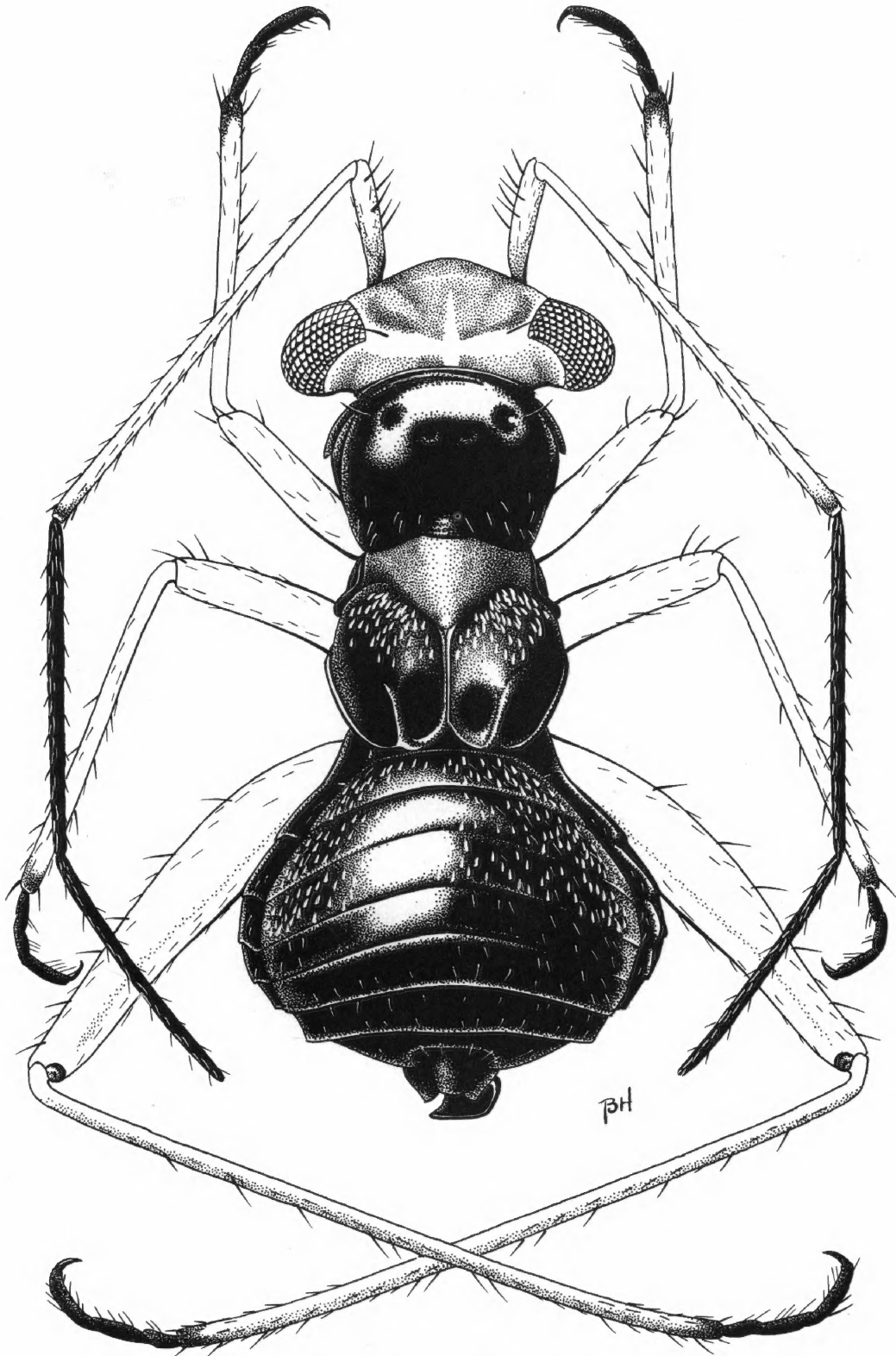


FIG. 1. *Myrmecophyes oregonensis*.

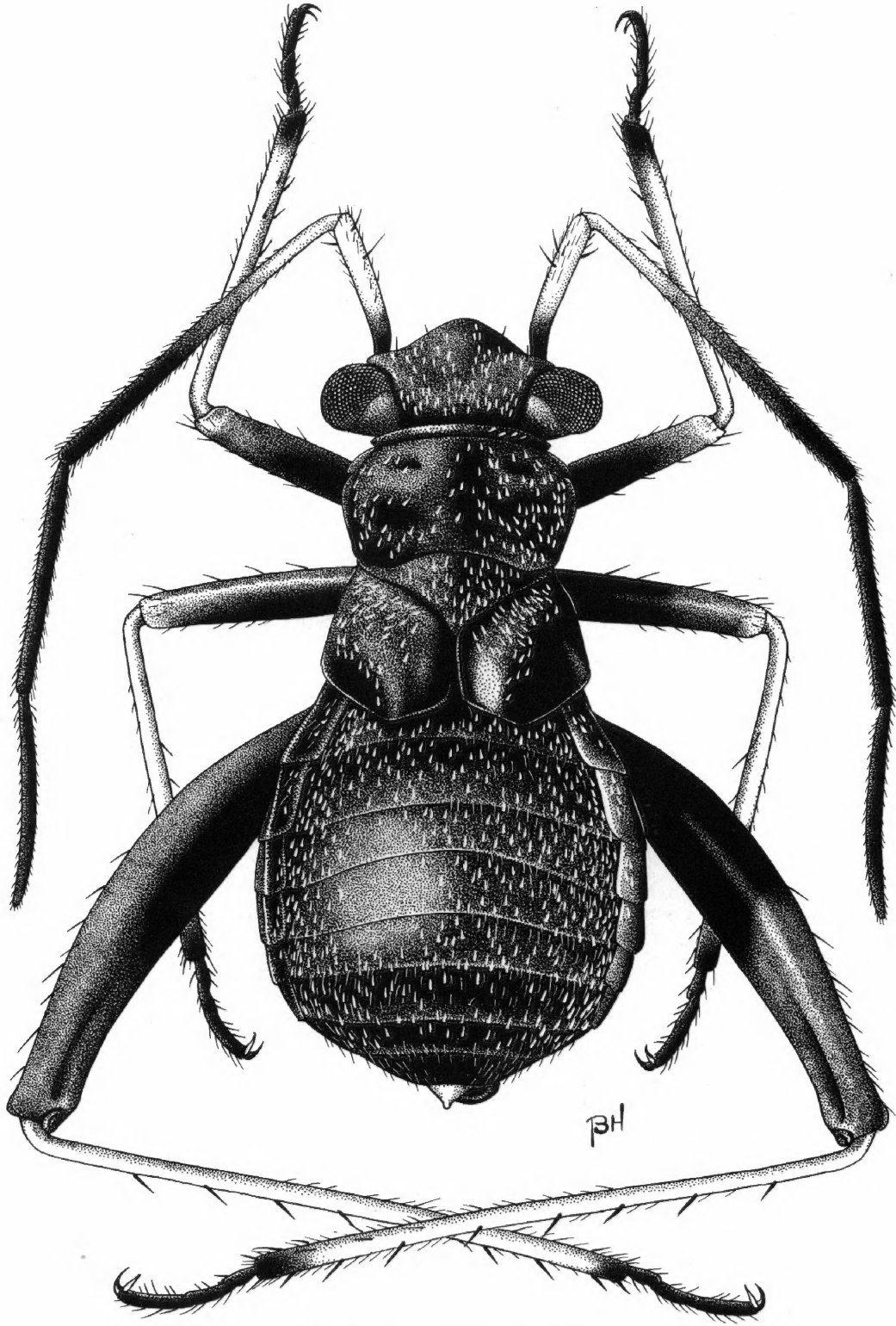


FIG. 2. *Anapus americanus*.

***Myrmecophyes oregonensis*, new species**

Figures 1–19

DIAGNOSIS: Recognized by its elongate face, with the height of the face below the eye slightly greater than two times the height of the eye, the substylate eyes projecting well beyond the lateral margins of the pronotum, the generally highly polished shining body surface, the strongly basally constricted abdomen, striking antlike habitus, and the form of the male genitalia.

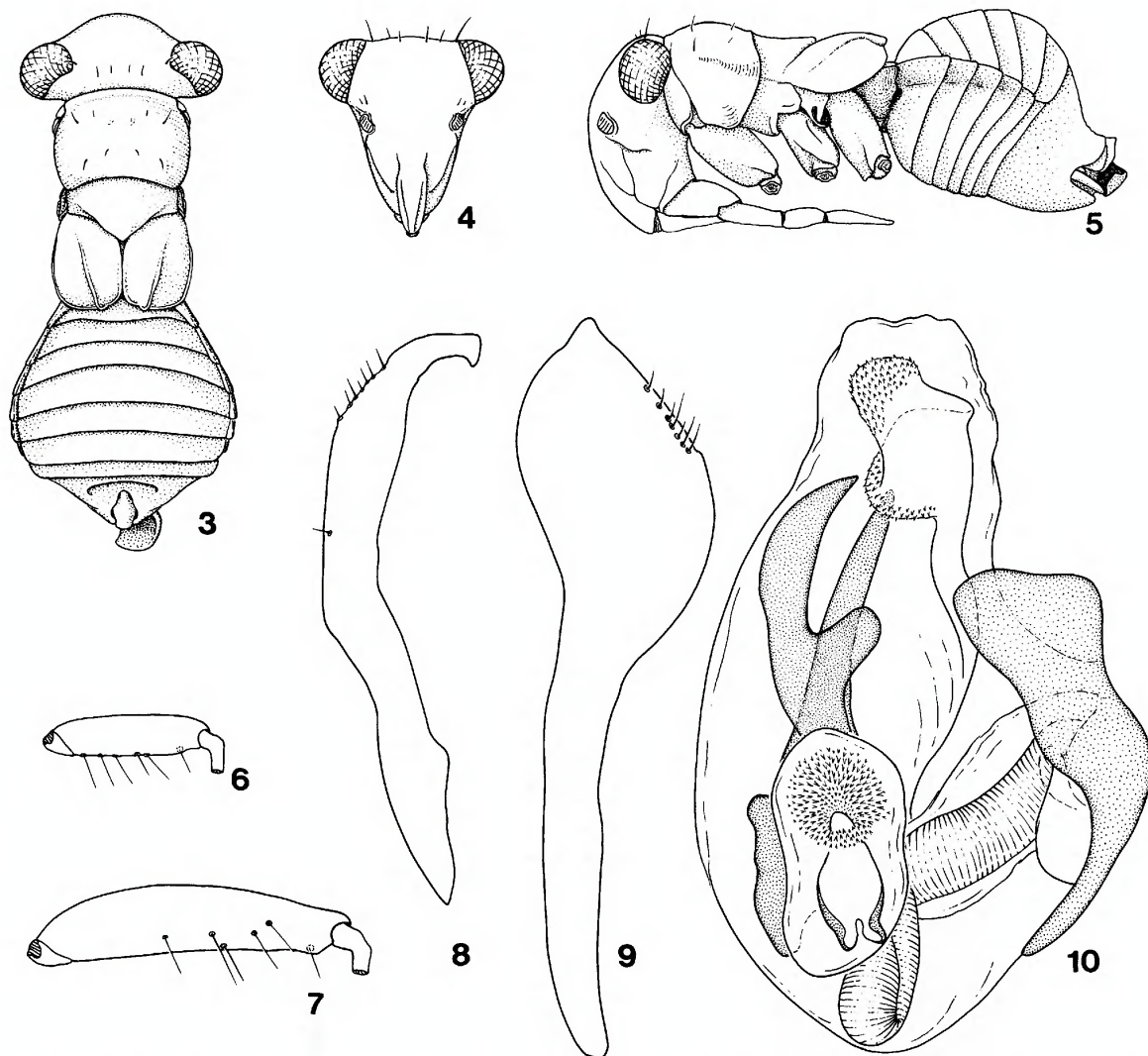
DESCRIPTION: Brachypterous male. Figures 1, 3–5. Small, antlike; pronotum, hemelytra, and abdomen jet black; scutellum with reddish cast posteromesially; head, meso- and metathoracic pleura, and legs except tarsi, medium orange-brown; antennal segments one and two pale yellow brown; frons and labrum usually infusate; tibiae distally, all tarsi, and antennal segments three and four nearly black; spines on antennal segment one and all femora and tibiae black.

Dorsum except scutellum highly polished, shining; scutellum shagreened, with whitish bloomlike appearance; thoracic pleura and all appendages dull; head and pronotum with a few nearly erect black hairs; claval portion of hemelytra and abdominal tergites three, four, and five with weakly shining, appressed, scalelike setae; remainder of abdominal dorsum with scattered, short, reclining setae, abdominal venter with numerous, relatively long, light, reclining setae; mesial and ventral surface of antennal segment one with approximately 10 erect black spines of length slightly greater than diameter of segment, segments two, three, and four with short reclining vestiture mixed with slightly longer reclining black setae; femora with some inconspicuous, reclining, pale setae and a few semierect black spines on dorsal surface; tibiae with scattered, erect spines about as long as tibial diameter.

Head vertical; vertex broad, smooth, ecarinate, nearly flat in frontal view at about level as dorsal margin of eyes (figs. 4, 5); eyes relatively small, substylate, well removed from anterolateral angles of pronotum and projecting well beyond lateral margins of pronotum;

height of face below eyes slightly greater than twice the height of an eye (fig. 4); antennae inserted well below ventral margin of eye, all segments cylindrical, one slightly enlarged, two increasing slightly in diameter distally, diameter of three and four subequal to distal portion of segment two (see measurements); labium very stout, reaching to posterior margin of second abdominal sternite (fig. 5); pronotum more or less quadrate in dorsal view, anterior margin smoothly convexly curved, flattened, and weakly reflexed; lateral margins smoothly rounded in all views, posterior margin concave across scutellum; pronotal lobes not demarcated, disc with two weak, proximal depressions; scutellum declining steeply from midline, without carinae or impressed lines; hemelytra greatly reduced, undifferentiated, reaching only to posterior margin of abdominal tergite two; claval suture represented posteriorly by a distinct carina, lateral and posterior hemelytral margins narrowly but distinctly reflexed; abdomen greatly expanded posterior to basal segments, especially in lateral view, lateral margins evenly rounded in dorsal view; dorsal margin of genital capsule strongly sloping posteroventrally in lateral view; protibiae relatively short, distinctly increasing in diameter distally, mesotibiae and metatibiae cylindrical; metafemora not conspicuously enlarged; six mesofemoral trichobothria (fig. 6), seven metafemoral trichobothria (fig. 7), basal structure of trichobothria as in figure 16, trichoma compact, bothrium recessed; tarsi as in figure 1, claws relatively broad basally, smoothly curved and tapering distally, pulvilli absent; claw hairs absent, basal claw spicules present (figs. 17–19; see Schuh, 1976), parempodia fleshy, recurved, convergent apically.

MALE GENITALIA: Figures 8–10. Vesica with a well-developed secondary gonopore, two confluent subterminal, spinose lobes, and two heavily sclerotized spines, one lanceolate, the other with a curved distal portion and a median thumblike projection; left paramere with more or less cylindrical shaft, tapering distally, hooked apically, and with a row of erect setae subapically on outer



FIGS. 3-10. *Myrmecophyes oregonensis*. 3. Dorsal view of male. 4. Frontal view of head of male. 5. Lateral view of male. 6. Mesofemoral trichobothria. 7. Metafemoral trichobothria. 8. Left paramere. 9. Right paramere. 10. Lateral view of aedeagus, including phallobase.

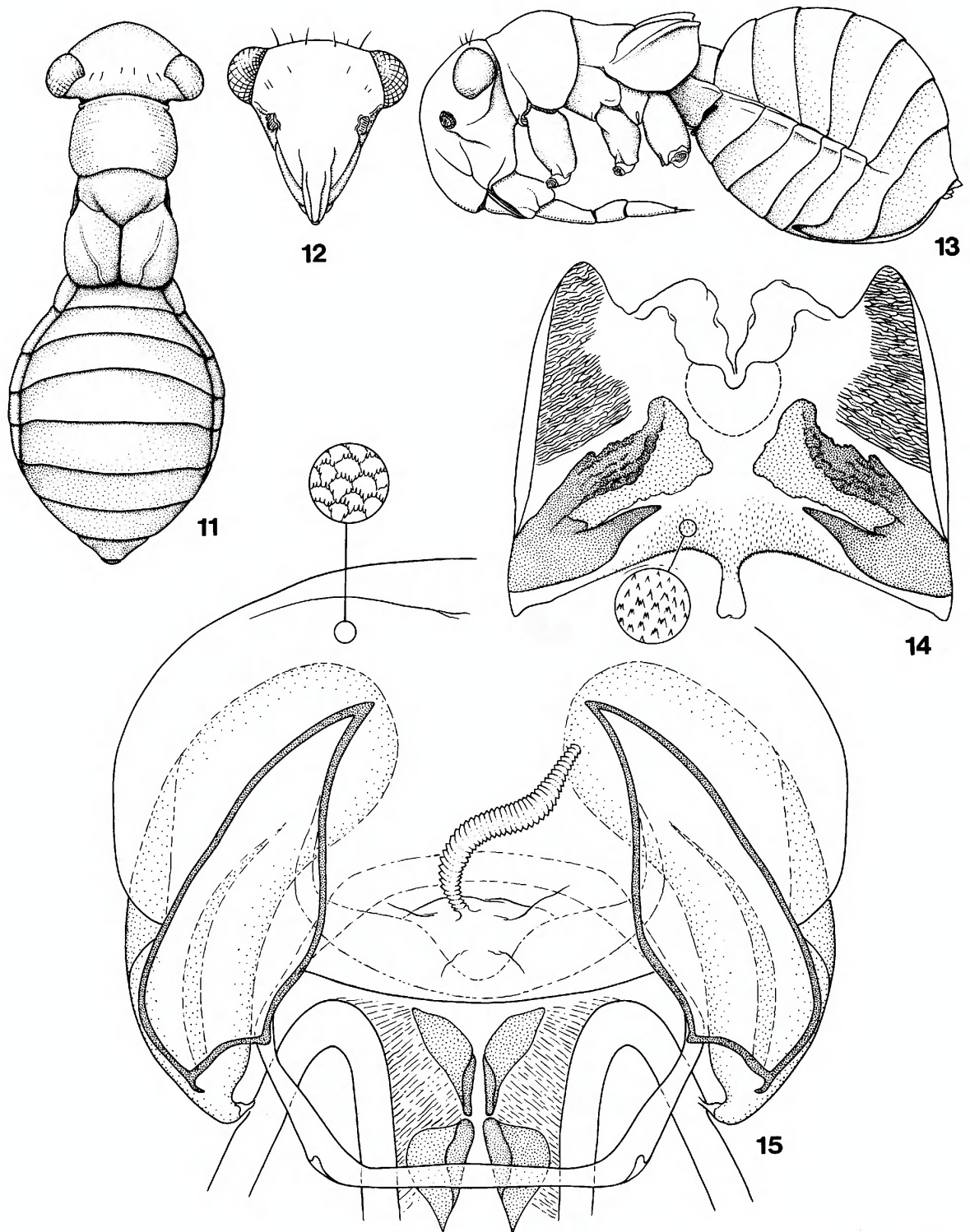
margin; right paramere with a long basal shaft, flattened and spoon shaped distally with a single row of erect setae.

BRACHYPTEROUS FEMALE: Figures 11-13. Very similar in coloration, vestiture, and body surface texture to male, body proportions different (compare figs. 3-5 and 11-13 and measurements); abdomen more conspicuously bulbous than in male.

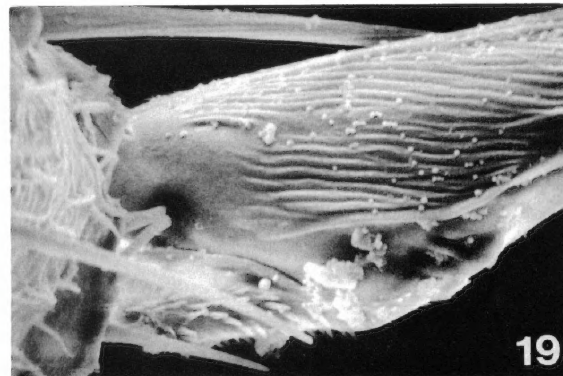
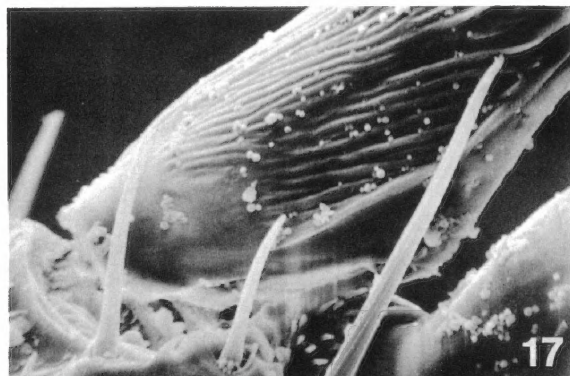
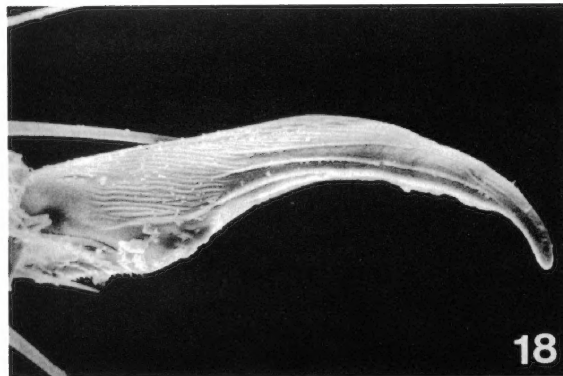
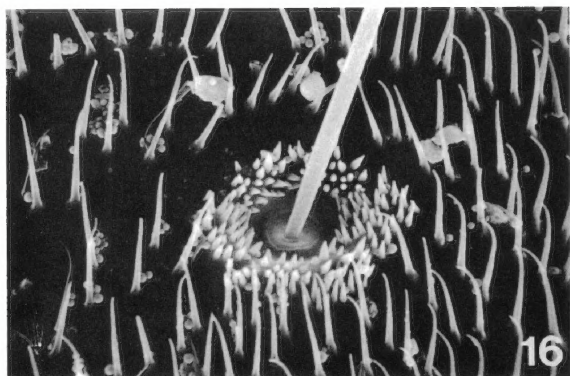
FEMALE GENITALIA: Figures 14, 15.

Posterior wall anterolaterally with fine, closely spaced, transverse striae, posteriorly with a distinctly sclerotized trapezoidal platelike area with a "finger-like" projection arising laterobasally; sclerotized structures in vulvar area between bases of anterior ovipositor valves symmetrical; rings of bursa copulatrix lightly sclerotized, not inflexed laterally.

MEASUREMENTS (MALE AND FEMALE, RE-



FIGS. 11–15. *Myrmecophyes oregonensis*. 11. Dorsal view of female. 12. Frontal view of head of female. 13. Lateral view of female. 14. Posterior wall of female genitalia. 15. Dorsal view of bursa copulatrix and associated structures of female.



FIGS. 16–19. *Myrmecophyes oregonensis*. 16. Mesofemoral trichobothrium, 2200 \times . 17. Base of claw, lateral view, 2100 \times . 18. Lateral view of claw, 800 \times . 19. Lateral view of claw, 1850 \times .

SPECTIVELY): Total length 2.53, 3.03; length of head .28, .45; width of head .88, 1.03; interocular space .45, .58; height of head .90, 1.03; length of pronotum at midline .41, .50, width of pronotum .63, .70; length of scutellum .30, .28; width of scutellum .48, .50; maximum length of hemelytra .48, .63; length of claval commissure .30, .33; length of metatibia 2.00, 2.15; antennal segments—one .40, .38, two 1.33, 1.25, three .90, .93, four .33, .35.

HOLOTYPE: Brachypterous male. Oregon, Harney County, Headquarters Squaw Butte Experiment Station, 55 km. W of Burns, 1540 m., June 15, 1978, J. D. Lattin and P. Oman; deposited in American Museum of Natural History.

PARATYPES: OREGON. *Deschutes County:* 14 mi. S of Millican, Pine Mountain, R15E T205 Sec 34, 1700 meters, June 21, 1979, ex *Agropyron spicatum* (P. Oman,

M. Schwartz, R. T. Schuh; AMNH, LM, OSU), 5 $\delta\delta$, 9 ♀♀ . *Harney County:* same data as holotype (AMNH, CAS, LM, OSU, USNM), 15 $\delta\delta$, 6 ♀♀ ; same data as holotype but June 11, 1974, Range 6, in, ex *Agropyron spicatum*, D-Vac sample (2 $\delta\delta$, 2 ♀♀), Range 6, in, ex *Festuca idahoensis*, D-Vac sample (2 $\delta\delta$), Range 6, in, misc., D-Vac sample (1 δ , 1 ♀), Range 7, in, ex *Agropyron spicatum*, D-Vac sample (1 ♀), Range 7, in, ex *Festuca idahoensis* (1 δ), Range 7, out, ex *Agropyron spicatum*, D-Vac sample (1 δ), Range 7, out, misc., D-Vac sample (1 δ , 1 ♀) (all J. Todd; OSU); same data as holotype but July 1, 1976 (D. Lightfoot; AMNH), 1 ♀ ; entrance, Squaw Butte Experiment Station, June 15, 1978 (J. D. Lattin, P. Oman; OSU), 4 $\delta\delta$, 2 ♀♀ . *Lake County:* 10 mi. NW of Silver Lake on Oregon Hwy 31, 1500 meters, May 27, 1979, ex *Agropyron spicatum* (M. Schwartz; OSU), 1 δ , 1 ♀ ; same data as

above but June 25, 1979 (J. D. Lattin, R. T. Schuh, M. Schwartz, G. Stonedahl; AMNH, OSU), 6♂♂, 5♀♀.

ADDITIONAL SPECIMENS: Same data as holotype but Range 6, in, ex *Agropyron spicatum*, D-Vac sample, (two nymphs), Range 7, in, ex *Festuca idahoensis*, D-Vac sample (two nymphs) (J. Todd; OSU).

DISCUSSION: *Myrmecophyes oregonensis* possesses the defining characters of the subfamily Orthotylinae, tribe Halticini (Carvalho, 1952, 1955; Wagner, 1955; Schuh, 1974), including the elongate face below the eyes, the broad vertex, and the distinctive parameres of the male genitalia. Using Carvalho's (1955) keys to the genera of Miridae of the World, *oregonensis* runs to couplet 18 of the Halticini but does not agree with either half of that dichotomy. Carvalho (1952, 1955, 1958) placed *Myrmecophyes*—the only described genus of Miridae to which *oregonensis* plausibly might belong—in the Pilophorini on the basis of antlike appearance, in spite of its Halticini defining characters. We examined existing diagnoses of *Myrmecophyes* to determine if *oregonensis* is actually one of its members. Wagner (1955) and Schuh (1974) placed *Myrmecophyes* in the Pilophorini.

Wagner (e.g., 1973) who has produced the most recent general works on the Hemiptera of the Western Palearctic, diagnosed *Myrmecophyes* as having an antlike appearance, generally black coloration, hemelytra with pale markings, usually reduced hemelytra, macropterous forms with the cuneus undifferentiated and the veins of the membrane not forming cells, the head under the eyes more than twice the height of an eye, segments one and two of the abdomen strongly constricted, the abdomen almost spherical behind, the abdomen of the male in lateral view with the genital opening perpendicular and directed downward, and the left paramere with the hypophysis in the shape of a narrow straight point.

Considering these characters in turn, *oregonensis* agrees in its antlike appearance and general coloration. The hemelytra are not marked with white and no macropterous forms are known. The head below the eyes

is over twice the height of an eye (25:11), in apparent agreement with Wagner's diagnosis. Only true segment two (segment one existing only as an obscured tergite) of the abdomen is constricted (lateral view); Wagner's (1973, p. 5) drawing is probably in error, in that it shows a complete first sternite and tergite in *alboornatus*. The abdomen is nearly spherical behind. The orientation of the opening of the genital segment in Wagner's drawing does not agree with his diagnosis, and neither is the opening in *oregonensis* perpendicular and directed downward, but rather posteriorly.

Bykov (1971) has produced the most recent comprehensive work on *Myrmecophyes*; he did not provide a diagnosis for the genus but did provide illustrations of the head, hemelytra, and male genitalia and defined six species groups. He included a key to the 18 species known from the Tien-Shan area of Soviet Central Asia, six of which he described as new; he divided these into six species groups on the basis of wing, color, and setal characteristics. His work did not include seven species previously described from Asia by Reuter (1904), Horváth (1927), and Kiritschenko (1931), nor of course *M. latus* Wagner (1975) from Yugoslavia, *M. gallicus* Wagner (1976) from southern France, and *M. montenegrinus* Wagner (1976) from Yugoslavia. Examination of Kiritschenko's (1931) dorsal view illustrations indicates, however, that a diagnosis based on *alboornatus*, as Wagner's apparently was, may be misleading, in that *alboornatus* has an apparently more strongly inflated abdomen than that in many of the Asian species, thus giving the appearance of a strong basal constriction.

Myrmecophyes oregonensis runs to *nitens* Bykov in Bykov's key (1971), but differs from it in the color of the head and legs, the shagreened scutellum, and other characters.

The male genitalia of *oregonensis* have features much like those illustrated for the Central Asian species by Bykov, including the large spicules and spinose membranous lobes of the vesica. The claspers are characteristic for the Halticini. Kelton (1959) examined the male genitalia of the following

halticine genera: *Euryopicoris* Reuter, *Halticus* Hahn, *Labops* Burmeister, *Orthocephalus* Fieber, and *Strongylocoris* Blanchard. Of these, the vesica of *Myrmecophyes* probably is closest to that of *Orthocephalus mutabilis* (Fallén) in its possession of well-developed spiculi. Further comparative studies of halticine male genitalia would certainly be valuable in helping to establish relationships within the group.

The only descriptive information on Halticini female genitalia seems to be the work of Slater (1950) who examined species of *Halticus*, *Labops*, *Orthocephalus*, and *Strongylocoris*. The posterior wall of *oregonensis* seems to resemble that of *Halticus intermedius* Uhler as illustrated by Slater (1950). The bursa copulatrix and associated structures of *oregonensis* do not particularly resemble those for any species illustrated in the literature. As with the male, serious comparative morphological work is needed for the female genitalia of the Halticini.

One structure of interest was observed during our dissection of female *oregonensis*. The small sclerites which lie at the base of the anterior ovipositor valves in the vulvar area ventral of the bursa copulatrix are symmetrical. This is in marked contrast to species of the Phylinae that we have examined in which these structures are weakly to strongly asymmetrical (see Henry and Schuh, 1979). Thus, we may have information indicating that these structures are not always asymmetrical in the Miridae, and that in their asymmetrical (derived) state they may be useful in recognizing higher groups within the family.

Our morphological examinations suggest, then, that of known Halticini genera, *oregonensis* seems to agree most closely with *Myrmecophyes*.

The only taxon presently described from North America which seems to show a potentially close relationship with *oregonensis* is *Anapus americanus* Knight (1959) (fig. 2). The two taxa differ in a number of characters. The height of the head below the eyes in *americanus* is just two times the height of an eye (26:13). The eyes in *oregonensis* might be considered "substylate," project-

ing well beyond the pronotum laterally, whereas in *americanus* they are "sessile" and the width of the head is more or less equal to the maximum width of the pronotum. In lateral view, *americanus* has a nearly spherical abdomen, although it is somewhat less strongly constricted basally than that of *oregonensis*. *Anapus americanus* has a dull, shagreened body surface, generally covered with sericeous scalelike setae; *oregonensis* has a highly polished body with some scalelike setae at the base of the hemelytra and on abdominal tergites three, four, and five.

This species does present an interesting distributional disjunction, because all previously described species of *Myrmecophyes* are distributed from Soviet Central Asia to western Europe. The significance of this disjunction is difficult to assess because of the scanty information available on most members of the genus. It may, however, have parallels in other halticines, such as *Anapus* Stål and possibly *Labops*. Such apparent distributional anomalies offer challenging problems in phylogenetic and biogeographic analysis.

Holarctic distributions might be divided into two groups. Those of widely distributed taxa and those with more restricted distributions in each hemisphere. Both types have been treated as Beringian dispersal phenomena in many biogeographic analyses (Gressitt, 1963). *Myrmecophyes* is poorly represented in the western Palearctic and is not known from eastern North America, two areas that are very well collected. No information is available on the far eastern Palearctic. Further collecting in Siberia and the western United States might reveal additional related taxa. Even if such taxa were found, they would not necessarily reveal a history of Late Tertiary dispersal across Beringia, but might suggest an older history for the group. Only a phylogenetic analysis of included species would clarify this point. Phylogenies congruent with equivalent distributions for other groups would lend support to a non-dispersal explanation for these wide-ranging distributions.

HABITAT: The type locality southwest of

Burns, Oregon is in a shrub-steppe featuring *Artemisia tridentata* Nutt., and the native perennial bunch grass *Agropyron spicatum* (Pursh.) Scribn. and Sm. (Franklin and Dyrness, 1973). Scattered juniper trees are found nearby. Annual precipitation is about 30 cm. Temperatures range from -11° C. in January to 30° C. in July.

Specimens in the long series of adults of both sexes collected on May 27, 1978 at the type locality were first encountered beneath rocks about 10 A.M. As the morning warmed up, individuals were swept from a variety of grasses, particularly on the developing heads. This was a disturbed area near the buildings of the station. Additional specimens were collected in late afternoon just inside the entrance to the station in an undisturbed situation with fewer species of grasses. This latter site was a typical *Artemisia-Agropyron spicatum* habitat. Specimens were collected from both *Festuca idahoensis* Elmer and *Agropyron spicatum* with a suction device on June 11, 1974 by James Todd at several sites on the station. Late instar nymphs were included in samples from both grass species. Specimens from the Pine Mountain and Silver Lake localities, some distance to the west of the type locality, were taken in undisturbed *Artemisia-Agropyron* habitat (also with scattered juniper) on *Agropyron spicatum*.

Myrmecophyes oregonensis is likely widespread, at least throughout the *Artemisia-Agropyron spicatum* region. It belongs to a small, but discrete early-season steppe Hemiptera fauna that includes *Labops* spp. and the moss tingid *Acalypta cooleyi* Drake. Further collecting during the early spring throughout the steppe region may produce additional taxa for this early appearing fauna.

The appearance and relative abundance of *M. oregonensis* seem to be correlated with the phenology of its grass host or hosts. The species is often collected in association with members of the grass feeding mirine tribe Stenodemini.

The habits of *M. oregonensis* appear to agree with those of at least some Old World species of *Myrmecophyes*. Kerzhner and

Yachevskii (1967) recorded *M. alboornatus* as occurring on *Agropyron* spp. in the European USSR; Bykov (1971) recorded *M. macrotrichius* Horváth as occurring on *Festuca* and *Carex*, and indicated that several other species of *Myrmecophyes* are widely polyphagous on herbaceous plants, although he did not say if these habits apply to nymphs and adults or adults only. Thus, it is possible that some of the species treated by Bykov may breed on grasses and then disperse and feed on other non-graminaceous plants later in the season, as is commonly observed in *Irbisia* spp. in the western United States, for example (*M. Schwartz*, personal commun.).

Several other genera of Halticini appear to be closely associated with grasses and probably some other monocots. Records for Kerzhner and Yachevskii (1967), Wagner (1973), and North American collections indicate that members of the genera *Chlorosomella* Horváth, *Dimorphocoris* Reuter, *Oraniella* Reuter, and *Labops* all breed on grasses, *Labops* possibly also breeding on Cyperaceae and Juncaceae; Wagner (1973) recorded *Schoenocoris* Reuter on Juncaceae. The genera *Anapus*, *Halticidea* Reuter, *Orthocephalus* and *Halticus* also are known to feed on grasses (Kerzhner and Yachevskii, 1967; Wagner, 1973; personal observ.) although they also feed on a number of genera of annual dicots. *Anapomella* Putshkov, *Euryopisoris* Reuter, *Pachytomella* Reuter, *Piezocranum* Horváth, *Plagiolytus* Scott, and *Strongylocoris* apparently do not feed on grasses (Kerzhner and Yachevskii, 1967; Wagner, 1973).

HABITS: *Myrmecophyes oregonensis* cannot fly, but can jump distances up to 10 cm.

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