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SEVEN NEW SPECIES OF OSTRACODS FROM TENNESSEE

(Cypridae: Candocyprinae and Cypridopsinae)

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A survey of the ostracod fauna in twenty-four counties of Tennessee was made from 1958 to 1960 as part of the research for the Ph.D. degree; the Central Basin was the area of concentrated collecting.

One species of *Candona,* two species of *Cypria* and four species of *Cypridopsis* were discovered to be new and are described in this paper.

Since specimens must be dissected and mounted in glycerin jelly in order to determine species, the holotype and the allotype often do not show all diagnostic parts in position for critical study. Therefore, the descriptions of species are based on these types supplemented by a minimum of paratypes. Drawings were made with the aid of a camera lucida. The size of each drawing is indicated by a scale of magnification made by the projection of a stage micrometer scale at the time of drawing. Measurements were made by the use of an ocular micrometer.

Candona lingulata sp. n.
Figs. 1-11

Description of Holotypic Female. The two valves are similarly shaped, somewhat reniform, the left slightly longer and higher than the right; more broadly rounded anteriorly, greatest height in the posterior one-third, dorsal margin sloping to a narrowly rounded posterior margin in the right valve, slightly angular in the left; concave ventral margin (Fig. 1). Left valve length 1.20 mm, height 0.60 mm; right valve length 1.15 mm, height 0.55 mm; width of shell 0.48 mm. The mandible has coarse teeth; the medial distal seta on the penultimate segment of the mandibular palp is smooth, the antepenultimate segment has four setae in the bundle on the inner margin as in the group Acuminata (Fig. 2). The exopodite plate of the first thoracic leg bears two setae. The first segment of the endopodite of the second thoracic leg equals the combined length of the three succeeding segments. There are fine setae along the margin of the first segment proximal to the long seta, three short spines on the second segment proximal to the long seta, several short spines on the second and third segments on the surface opposite the long seta. The claw length equals five and one-half times the length of the terminal segment (Fig. 3). The penultimate segment of the third thoracic leg is divided; the shortest distal seta is five times the length of the terminal segment, the longer seta of the pair is one and eight-tenths times the shorter and nine-tenths of the length of the reflexed seta (Fig. 4). The furca is slightly curved, the ventral length equals ten times the least width; the dorsal seta is three times the least width of the ramus and is separated from the subterminal claw by the length of the seta; the terminal claw is more than one-half the ventral length of the ramus, the subterminal claw is more than three-fourths the length of the terminal claw; both claws have moderately prominent teeth (Fig. 5). The genital lobe is finger-shaped, with a downward bend near the middle; the length of the genital lobe equals five times the least width of the ramus (Fig. 5).

Description of Allotypic Male. The valves are shaped much like those of the female; the ventral margin is more concave, and the posterior end more broadly rounded than in the female (Fig. 6). The shape of the shell is oval from dorsal view, narrowly rounded posteriorly and tapering to a blunt point anteriorly. Left valve length 1.20 mm, height 0.62 mm; right valve length 1.10 mm, height 0.55 mm. Width of shell 0.50 mm. Two stout male setae arise from the distal end of the antepenultimate segment of the six-segmented second antenna, and they extend beyond the terminal segment with transparent, funnel-shaped tips; the sensory organ on the first segment of the endopodite has a length equaling two-thirds of the width of the segment at the level of attachment. A slender sensory organ arises from a similar position on the antepenultimate segment, another from the distal end of the terminal segment; the terminal claws are long and slender (Fig. 7). The prehensile palps are similar, roughly L-shaped; the length of the portion proximal to the curvature is two and one-fourth times the width, the portion distal to the bend is about one-fourth as wide as the proximal part; there are two setae near the curvature and there is a minute terminal spine (Figs. 8, 9). The male furca is more slender and curved than that of the female, the ventral length equals thirteen times the least width; the subterminal claw is one and one-half times the length of the dorsal seta and equal to one-half the ventral length of the ramus; the terminal seta is one-fourth the length of the subterminal claw; the terminal claw is one and one-sixth times the length of the subterminal claw (Fig. 10). The penis apparatus is oval; the lateral lobe is divided into two processes, one

Figs. 1-11 *Candona lingulata* sp. n.

Fig. 1 right valve of female
Fig. 2 mandible of male
Fig. 3 second thoracic leg of female
Fig. 4 third thoracic leg of female
Fig. 5 furca and genital lobe of female
Fig. 6 right valve of male
Fig. 7 second antenna of male
Fig. 8 right prehensile palp
Fig. 9 left prehensile palp
Fig. 10 furca of male
Fig. 11 penis apparatus

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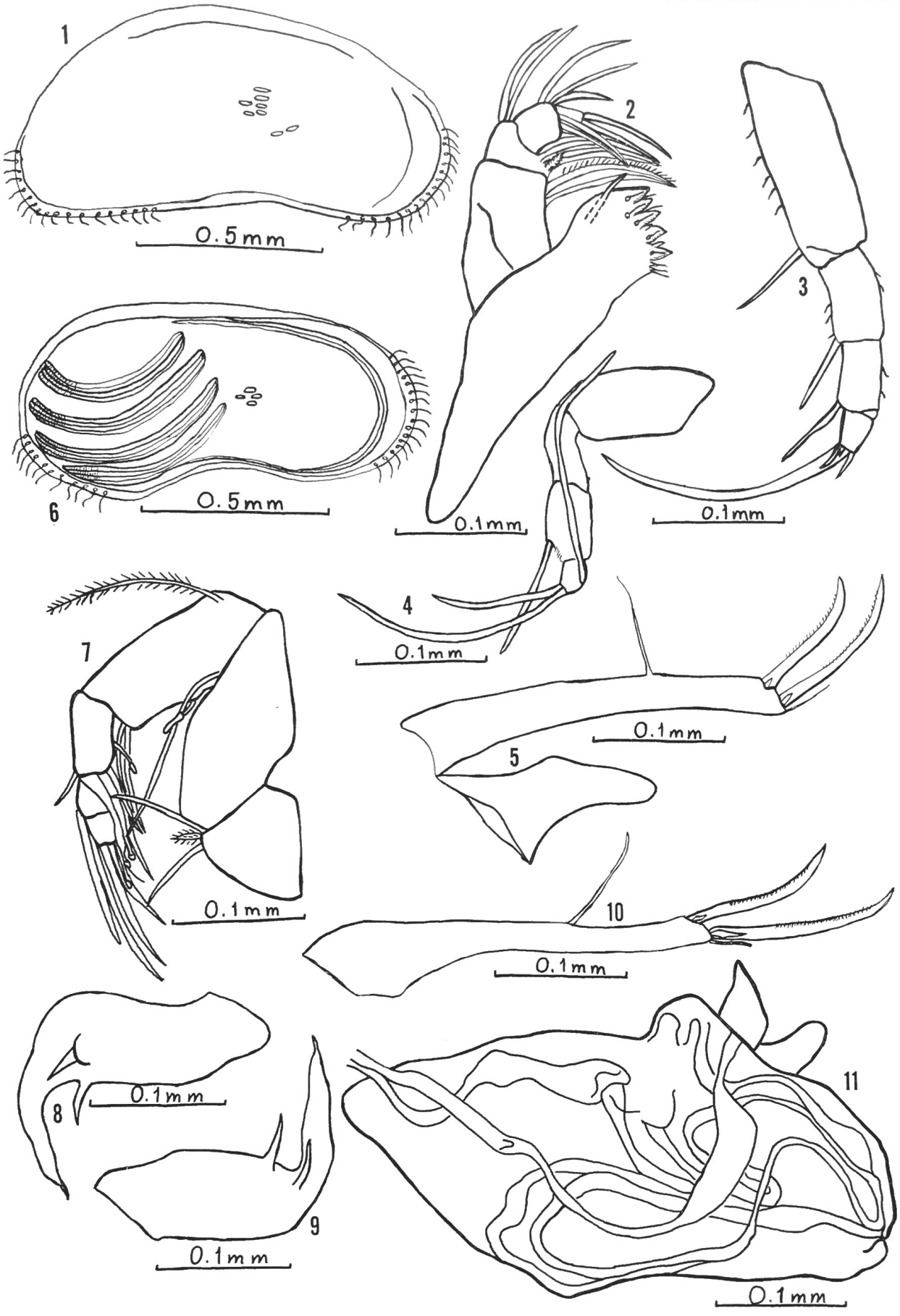


Figs. 1-11 **Candona lingulata** sp. n.

triangular and tapering to a sharp point, the other lingulate; the distal lobes are small, not extending beyond the margin (Fig. 11).

Diagnosis. Candona lingulata is a member of the group Acuminata. Females may be differentiated from most members of the group by the finger-shaped genital lobe. They may be separated from *C. sigmoides* Sharpe 1897, from *C. scopulosa* Furtos 1933, and from *C. indigena* Hoff 1942, which also have finger-shaped genital lobes, by the lack of the downward bend near the middle of the genital lobe of these species. Most males of the group Acuminata have an undivided lateral lobe in the penis apparatus. *C. indigena* has a divided lateral lobe, one process of which is triangular but the other is not lingulate. This species also differs in the relative length of the pair of distal setae of the third leg; the shorter seta of the pair is much shorter in *C. indigena than in C. lingulata.*

Range. This species is known from the type locality and from a spring about one mile east of Ozone Falls, Ozone, Cumberland County, Tennessee, on U.S. Highway 70 N.

Type Locality. A woodland pond about two miles west of Kingston Springs, Cheatham County, Tennessee, on the south side of the Nashville-Chattanooga-St. Louis Railroad. One female, one male and nine late instar larvae were collected on October 18, 1958.

Disposition of Types. The holotypic female and allotypic male will be deposited in the United States National Museum. Both are dissected and mounted in glycerin jelly. The allotype was injured in the course of study and the valves were lost. A paratype male remains in the collection of the author.

The specific name comes from the Latin *lingulata,* meaning "tongue-like"; so named because of the tongue-like process of the penis apparatus.

Cypria brevisetigera sp. n.
Figs. 12-22

Description of Holotypic Female. The shell is compressed; valves are reniform, the dorsal margin is evenly rounded, the greatest height is anterior to the middle; the posterior margin is broadly and bluntly rounded, the anterior margin is more narrowly rounded. The ventral margin is concave toward the middle; there is a hyaline border on the anterior and the posterior margin; there are hairs around the margin and scattered over the surface of the valve. Three elliptical muscle scars form a dorso-ventral row near the center of the valve, three or more smaller scars are clustered postero-ventral to these, and two or three longer scars lie anterior to the main group. The ovary forms a wide, almost straight band extending from the postero-ventral margin to the level of the muscle scars almost midway between the scars and the posterior border (Fig. 12). The shell is translucent, light brown in color and of heavy texture. Left valve length 0.79 mm, height 0.45 mm; right valve length 0.76 mm, height 0.44 mm. Natatory setae of the first antenna are well developed, equal in length to the sum of the lengths of all segments of the appendage. Natatory setae of the second antenna are shortened, five in number and not quite reaching the tips of the terminal claws. These claws are long and slender; the sensory organ arises from a two-segmented stalk (Fig. 13). The mandibular palp bears a comb of fine setae at the proximal end of the penultimate podomere on the medial surface and a group of larger setae in corresponding position on the lateral surface (Fig. 14). The claw of the second leg is long and slender, approximately equal to the combined length of the second, third and fourth segments of this leg. The terminal segment of the third leg is almost cylindrical, the length is equal to about twice the width. The pair of terminal setae of this leg are quite unequal, the shorter is equal to about one-half the length of the longer (Fig. 15). The length of the furcal ramus equals nine times the least width; the subterminal claw equals one-half the ventral length of the ramus and two-thirds of the length of the terminal claw. The dorsal and terminal setae are almost equal in length, twice the least width of the ramus.

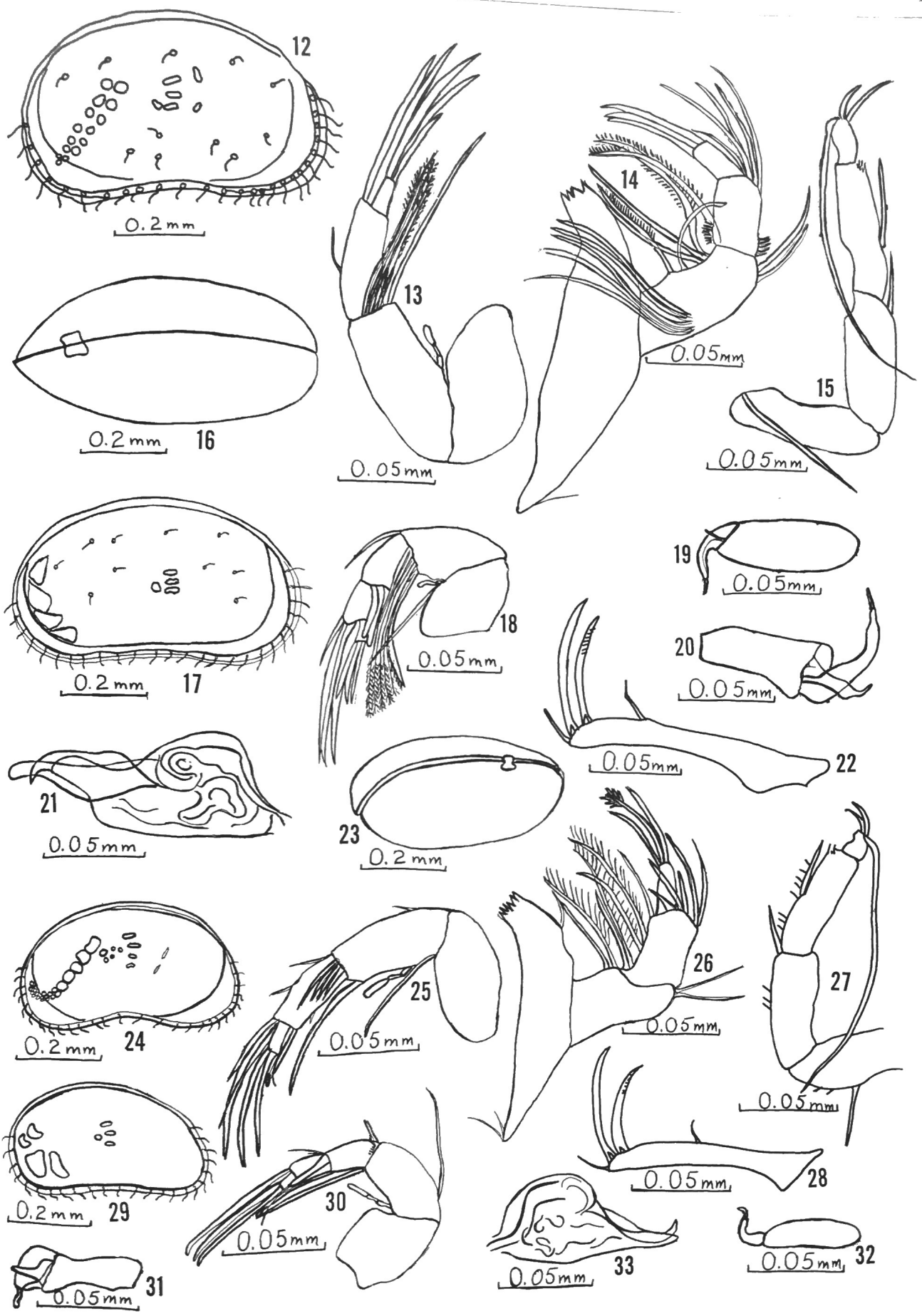
Description of Allotypic Male. The shell is elliptical in dorsal view, rounded posteriorly and bluntly pointed anteriorly; the width is equal to one-half the length (Fig. 16). The valve resembles that of the female but is a little smaller (Fig. 17). Right valve length 0.63 mm, height 0.37 mm; left valve length 0.70 mm, height 0.40 mm; width of shell 0.32 mm. The second antenna is six-segmented through division of the second segment of the endopodite; two male setae arise from the distal end of the antepenultimate segment (Fig. 18). The propodus of the left prehensile palp is longer than the corresponding part of the right palp, the length equals three and one-third times the distal width, with the greatest width in the middle; the dactylus is slender and gently recurved (Fig. 19). The propodus of the right palp is narrowest at the proximal end, expands slightly in the middle and is widest at the distal end; the length is twice the distal width. A strong process with slender

Figs. 12-22 *Cypria brevisetigera* sp. n.

Fig. 12 right valve of female
Fig. 13 second antenna of female
Fig. 14 mandible of female
Fig. 15 third leg of female
Fig. 16 dorsal view of male
Fig. 17 right valve of male
Fig. 18 second antenna of male
Fig. 19 left prehensile palp
Fig. 20 right prehensile palp
Fig. 21 penis apparatus
Fig. 22 furca of male

Figs. 23-33 *Cypria fontana* sp. n.

Fig. 23 dorsal view of shell
Fig. 24 right valve of female
Fig. 25 second antenna of female
Fig. 26 mandible of female
Fig. 27 third thoracic leg of female
Fig. 28 furca of female
Fig. 29 right valve of male
Fig. 30 second antenna of male
Fig. 31 right prehensile palp
Fig. 32 left prehensile palp
Fig. 33 penis apparatus



Figs. 12-22 **Cypria brevisetigera** sp. n. Figs. 23-33 **Cypria fontana** sp. n.

curved tip extends from the distal end of the propodus across the side of the dactylus; the dactylus is slightly inflated in the middle, slender and recurved at the tip (Fig. 20). The ejaculatory process is large in comparison with other body parts, elongate elliptical, with five setose whorls in addition to terminal crowns; the ejaculatory duct is inflated both proximally and distally. The penis apparatus is of bird's head shape in outline, terminating in two movable processes, one with rounded, gently curved tip, the other also is curved, with heavy chitinous reinforcement, a pointed protrusion near the tip, and a sharply pointed tip (Fig. 21). The ventral length of the furcal ramus equals seven times the least width. The dorsal seta and terminal seta are of equal length, one and one-half times the least width of the ramus. The dorsal seta is removed from the subterminal claw by twice the least width of the ramus (Fig. 22).

Diagnosis. This species may be distinguished from those other species which possess very short natatory setae of the second antenna by the size and shape of the shell, the relative length of the pair of terminal setae of the third leg, the structure of the furca and of the male sex organs. *Candocypria osburni* Furtos 1933 is the only previously described species which has rudimentary natatory setae of the second antenna combined with very unequal paired setae of the third leg. It is a larger species with different shell shape, the natatory setae are even shorter than in this new species, the dorsal and terminal setae of the furca are relatively shorter, and the pointed terminal process of the penis apparatus lacks the pointed protrusion. *Cypria brevisetigera* was compared with paratypes of *Candocypria osburni* at the United States National Museum.

Range. The species was taken only from the type locality.

Type Locality. A spring branch about one hundred feet east of the intersection of Stokes' Lane and 21st Avenue South in Nashville, Davidson County, Tennessee. The species is not very abundant; ten adults were obtained as the result of five collections made November 1, 1958, August 29, 1962, November 24, 1962, February 4, 1963, and July 1, 1963.

Remarks. Furtos (1933) proposed the new genus *Candocypria* for her new species with rudimentary natatory setae of the second antenna, interpreting it as a transitional stage between the CYCLOCYPRINI and the CANDONINI. This new species with shortened natatory setae is placed in the genus *Cypria,* since shortening of the natatory setae of the second antenna occurs in certain species of a number of genera. The pair of setae of the third thoracic leg are no more unequal than in *Cypria obesa* Sharpe 1897 or in *Cypria mediana* Hoff 1942, and specialized male setae on the second antenna are characteristic of this genus.

Disposition of Types. The holotypic female, the allotypic male, a paratypic female and a paratypic male will be deposited in the United States National Museum. Other paratypes will remain in the author's collection. Both holotype and allotype are dissected. The holotype is stained with acid fuchsin and mounted in diaphane while the allotype is mounted in glycerin jelly.

The specific name comes from the Latin *brevisetigera,* meaning "bearing shortened setae"; so named because of the shortened natatory setae of the second antenna.

Cypria fontana sp. n.
Figs. 23-33

Description of Holotypic Female. The shell is narrowly elliptical in dorsal view, rounded posteriorly and bluntly pointed anteriorly; the width is about two-fifths of the length (Fig. 23). The valves are reniform; the dorsal margin is arched, the ventral margin straight or concave, anterior and posterior margins are narrowly rounded. The valve is brown with a narrow colorless border; marginal hairs terminate in sensory receptors in the border. There is a ventral flange on the left valve only. A dorso-ventral row of elliptical muscle scars are in the center of the valve, three irregular scars and two round scars lie posterior to these, and two elongate scars are anterior to the main group. The ovary forms a narrow, curved band in the posterior one-half of the value (Fig. 24). Right valve length 0.55 mm, height 0.27 mm; left valve length 0.56 mm, height 0.31 mm. Natatory setae of the first antenna are chiefly reduced to spines; four longer setae extend beyond the spines by a length equal to the sum of all segments of the appendage. Natatory setae of the second antenna are rudimentary, extending to the middle of the penultimate segment. The sense organ of the first segment of the endopodite arises from a two-segmented stalk, its length equals the width of the segment at the level of attachment. A smaller but similar structure arises from the distal end of the terminal segment (Fig. 25). One of the spines of the mandibular palp is toothed (Fig. 26). The terminal claw of the second leg equals the length of the distal three segments and is toothed near the tip. The terminal segment of the third thoracic leg is short, its width almost equals its length; the paired setae are almost equal, one and one-half times the length of the terminal segment (Fig. 27). The ventral length of the furcal ramus equals nine times the least width; the length of the terminal seta is twice the width of the ramus, the dorsal seta is a little shorter than the terminal seta and separated from the subterminal claw by four times the width of the ramus; the subterminal claw is three-fourths as long as the terminal claw and slightly toothed; the length of the terminal claw is almost two-thirds of the ventral length of the ramus (Fig. 28).

Description of Allotypic Male. The valve shape is like that of the female but smaller (Fig. 29). Right valve length 0.48 mm, height 0.27 mm; left valve length 0.50 mm, height 0.28 mm. Width of shell 0.21 mm. Most appendages resemble those of the female. Two male setae arise from the distal end of the antepenultimate segment of the second antenna; natatory setae extend no farther than the proximal one-third of this segment (Fig. 30). The propodus of the right prehensile palp is widened distally; its length is two and one-half times the distal width; a strong process extends from the propodus across the side of the dactylus.

The short, inflated dactylus curves and terminates bluntly (Fig. 31). The propodus of the left prehensile palp narrows proximally and distally; the length of the propodus is five times the distal width. The dactylus is slender, recurved, narrow at the distal end (Fig. 32). The ejaculatory apparatus is elliptical, its length is three times its width; there are five whorls of chitinous spines exclusive of terminal crowns; the ejaculatory tube is slightly expanded at each end. The penis apparatus is shaped like a bird's head in outline, with one straight movable process narrowly rounded at the distal end, the other process curved and sharply pointed at the tip (Fig. 33).

Diagnosis. Cypria fontana may be separated from other described species with rudimentary natatory setae by the difference in the third thoracic leg. *Candocypria osburni* and *Cypria brevisetigera* have very unequal paired setae of the third leg and this new species has equal paired setae. The natatory setae of the second antenna are shorter than in *Cypria brevisetigera,* almost as rudimentary as in *Candocypria osburni,* and *C. fontana* is a smaller species.

Range. In addition to the type locality, the species was collected from a spring one and one-half miles west of Dover, Stewart County, Tennessee, on U.S. Highway 79; from a spring under the concrete shell in Centennial Park, Nashville, Davidson County, Tennessee; and from springs flowing from a cave at Pegram, Cheatham County, Tennessee, on U.S. Highway 70.

Type Locality. A spring in Model, Stewart County, Tennessee. Thirty-five individuals of this species were collected April 16, 1960.

Disposition of Types. The holotypic female, the allotypic male, a paratypic female and a paratypic male will be deposited in the United States National Museum. Other paratypes will remain in the author's collection. Both holotype and allotype are dissected. The holotype is mounted in glycerin jelly; the allotype is stained with borax carmine and mounted in diaphane.

The specific name comes from the Latin *fontana,* meaning "of a spring"; so named because of the specific habitat.

Cypridopsis compressa sp. n.

Figs. 34-47

Description of Holotypic Female. The shell is elliptical, moderately compressed in dorsal view; the width is approximately one-half the length (Fig. 34). The valve is reniform; the height is little more than one-half the length, with the greatest height near the middle. There is a steep dorsal arch, an almost straight ventral margin; the valve is evenly rounded anteriorly, sub-truncate posteriorly. The two valves are almost symmetrical and there is a ventral flange on both valves. The valves are thin, transparent and unpitted; three major pigment bands of light gray extend dorso-ventrally, one anterior to the eye, one through the muscle scars, and one posterior to the middle (Fig. 35). Left valve length 0.60 mm, height 0.35 mm; right valve length 0.60 mm, height 0.32 mm. Shell width 0.32 mm. Natatory setae of the first antenna extend beyond the terminal segment by one and one-half times the sum of all segments. Natatory setae of the second antenna extend just beyond the tips of the claws; the sense organ is short, two-thirds of the segment width at the level of attachment. One terminal spine of the mandibular palp is toothed (Fig. 36). The outer masticatory process of the maxilla bears two sinuate spines which are not toothed (Fig. 37). The exopodite plate of the first thoracic leg bears three setae (Fig. 38). The terminal claw of the second thoracic leg is pectinate along the distal one-third of its margin; it is long, equal to the sum of segments one, two and three of the endopodite (Fig. 39). The claw of the third leg is flexible, curved at the tip, not pectinate, almost two-thirds as long as the penultimate segment (Fig. 40). The flagellum of the furca is twice the length of the base and six times the length of the dorsal seta (Fig. 41).

Description of Allotypic Male. The valve is similar to that of the female but a little lower and more angular. The testis coils form a loop extending from the anterior to the posterior region above the muscle scars (Fig. 42). Left valve length 0.60 mm, height 0.28 mm; right valve length 0.58 mm, height 0.27 mm. The second antenna is similar to that of the female but two long spines arise from the middle of the penultimate segment (Fig. 43). The prehensile palps of the first thoracic legs are dissimilar. The propodus of the right palp is widest in the middle, narrowing at proximal and distal ends, its length is three times its distal width; the dactylus is slightly inflated and curved, about four-fifths as long as the propodus (Fig. 44). The propodus of the left palp is widest at the distal end, its length is four times its width; the dactylus is short and falciform (Fig. 45). The ejaculatory apparatus bears fourteen whorls of spines including the terminal crowns (Fig. 46). The movable lobe of the penis apparatus is mitten-shaped, projecting posteriorly (Fig. 47).

Diagnosis. Of the species of *Cypridopsis* for which males have been described, *Cypridopsis compressa* most closely resembles *Cypridopsis okeechobei* Furtos 1936. It may be differentiated from this latter species by the proportions of the valves and by the absence of pits in the valves. In this new species the valve height is a little over one-half the length, and in *C. okeechobei* the valve height is approximately two-thirds the length. In *C. compressa* the valve width is about one-half the length, and in *C. okeechobei* the value width equals two-thirds the length. This new species can be differentiated from *C. howei* Ferguson 1964 by the difference in shape and proportion of valves, and the latter species has seventeen rows of chitinous spines in the ejaculatory apparatus. *C. compressa* is less tumid than other non-pitted, non-spiny members of the genus with a tri-radiate exopodite plate of the first thoracic leg, so the female can be distinguished in the absence of males.

Range. Known only from the type locality.

Type Locality. Savage Branch on a side road northeast of U.S. Highway 41 about a mile from Brooklyn, Davidson County, Tennessee. Forty-nine individuals of this species were collected on October 2, 1959.

Disposition of Types. The holotypic female, the

allotypic male, a paratypic female and a paratypic male will be deposited in the United States National Museum. Other paratypes will remain in the author's collection. Both holotype and allotype are dissected and mounted in glycerin jelly.

The specific name comes from the Latin *compressa*, meaning "narrow"; so named because this species is less tumid than most representatives of the genus.

Cypridopsis reptans sp. n.

Figs. 48-56

Description of Holotypic Female. The eye is well-developed. The shell width is approximately one-half the length, widest posterior to the middle; it is rounded posteriorly and pointed anteriorly in dorsal view (Fig. 48). The two valves are essentially alike, gently arched dorsally, subtruncate posteriorly, and rounded anteriorly; the ventral margin is sinuate, and there is a prominent postero-ventral angle. There is dark gray pigment on the anterior slope of the valve and posterior to the eye surrounding the muscle scar area. Marginal hairs are prominent and there are long, plain pore canals along the ventral border. The height is approximately one-half the length (Fig. 49). Left valve length 0.62 mm, height 0.31 mm; right valve length 0.59 mm, height 0.30 mm. Width of shell 0.30 mm. The first antenna bears long natatory setae. Natatory setae of the second antenna are rudimentary, not extending beyond the proximal one-third of the penultimate segment; the length of the sense organ equals three-fourths of the width of the segment at the level of attachment (Fig. 50). The mandibular palp has a toothed spine on the terminal segment (Fig. 51). There are two sinuate, non-toothed spines on the outer masticatory process of the maxilla (Fig. 52). The exopodite plate of the first thoracic leg bears three setae (Fig. 53). The terminal claw of the second thoracic leg is slightly denticulate, its length equals the sum of the first, second and third segments of the endopodite. Each of these three segments has a strong distal seta and the third segment has a short, hair-like seta beside the longer seta. The first segment has short, hair-like setae along the anterior margin (Fig. 54). The claw of the third leg is flexible, not noticeably denticulate (Fig. 55). The furca is greatly reduced, flagelliform; the terminal seta is two and one-half times the length of the base and about nine times the length of the dorsal seta (Fig. 56).

Male. No male of this species was collected.

Diagnosis. Cypridopsis reptans may be separated from most species of this genus by the rudimentary nature of the natatory setae of the second antenna. It may be distinguished from *C. echinatavalva* Wise 1962 by the lack of spines on the valve and by a much narrower shell. Natatory setae of the second antenna reach the base of the claws in *C. echinatavalva*. This new species resembles *C. subterranea* Wolf 1919, which has very rudimentary natatory setae on the second antenna, as well as long pore canals along the ventral border of the valve. However, the latter species differs in that the eye is rudimentary, the valve lacks pigment and its height equals more than one-half the length.

Range. Known only from the type locality.

Type Locality. A spring one and one-half miles west of Dover, Stewart County, Tennessee, on U.S. Highway 79. Seventy-four individuals of this species were collected on April 16, 1960, and on September 12, 1962.

Disposition of Types. The holotypic female and two paratypic females will be deposited in the United States National Museum. Other paratypes will remain in the collection of the author. The holotype is dissected and mounted in glycerin jelly.

The specific name comes from the Latin *reptans*, meaning "to creep"; so named because this species is unable to swim.

Cypridopsis arhiga sp. n.

Figs. 57-65

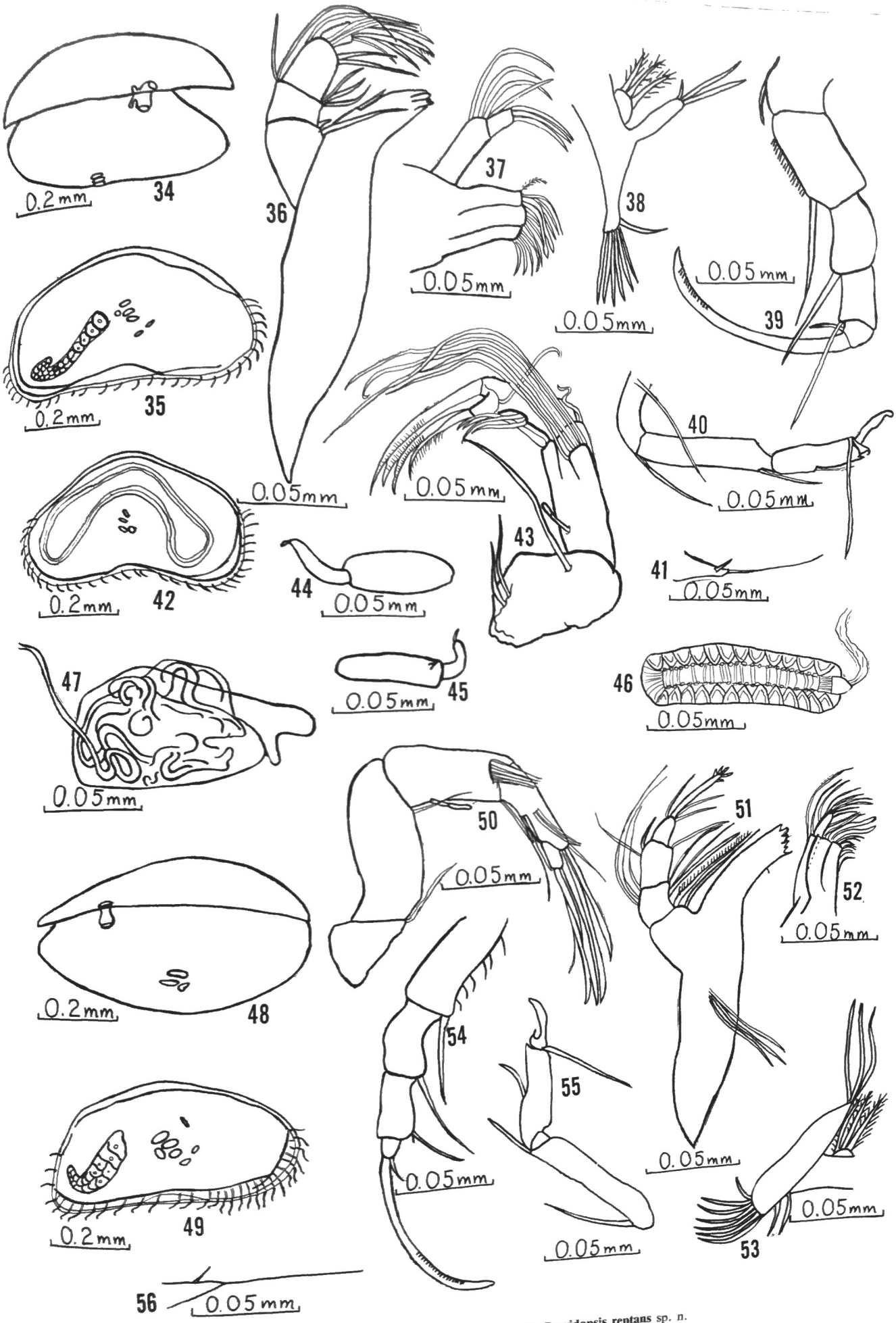
Description of Holotypic Female. The eye is well developed. The shell is elliptical in dorsal view, the width approximately one-half the length, widest near the middle, narrowly rounded posteriorly, bluntly pointed anteriorly (Fig. 57). The valves are similarly shaped, gently arched dorsally, subtruncate posteriorly, evenly rounded anteriorly and sinuate ventrally. Both valves have a ventral flange; the postero-ventral angle of the valve is usually a right angle. The color is pale green, the height approximately one-half the length; there are prominent marginal hairs and ventral pore canals (Fig. 58). Left valve length 0.53 mm, height 0.27 mm; right valve length 0.50 mm, height 0.25 mm; width of shell 0.27 mm. The first antenna has about three long natatory setae, the remaining setae are reduced to spines. The natatory setae of the second antenna are rudimentary, not extending beyond the proximal one-third of the penultimate segment; the length of the sense organ equals little more than one-half the width of the segment at the level of attachment (Fig. 59). The spines on the terminal segment of the mandibular palp are without teeth; a short feathered seta and two

Figs. 34-47 *Cypridopsis compressa* sp. n.

Fig. 34 dorsal view of shell
Fig. 35 right valve of female
Fig. 36 mandible of female
Fig. 37 masticatory processes and palp of female maxilla
Fig. 38 first thoracic leg of female
Fig. 39 second thoracic leg of female
Fig. 40 third thoracic leg of female
Fig. 41 furca of female
Fig. 42 right valve of male
Fig. 43 second antenna of male
Fig. 44 right prehensile palp
Fig. 45 left prehensile palp
Fig. 46 ejaculatory apparatus
Fig. 47 penis apparatus

Figs. 48-56 *Cypridopsis reptans* sp. n.

Fig. 48 dorsal view of shell
Fig. 49 right valve
Fig. 50 second antenna
Fig. 51 mandible
Fig. 52 masticatory processes and palp of maxilla
Fig. 53 first thoracic leg
Fig. 54 second thoracic leg
Fig. 55 third thoracic leg
Fig. 56 furca



Figs. 34-47 **Cypridopsis compressa** sp. n. Figs. 48-56 **Cypridopsis reptans** sp. n.

longer setae are located on the medial surface of the antepenultimate segment (Fig. 60). The outer masticatory process of the maxilla has two sinuous, non-toothed spines (Fig. 61). The exopodite plate of the first thoracic leg bears three setae (Fig. 62). The claw of the second thoracic leg is slightly denticulate, its length equals the sum of the first, second, and third segments of the endopodite. Each of these three segments has a strong distal seta (Fig. 63). The claw of the third leg is flexible, not denticulate (Fig. 64). The furca is greatly reduced, flagelliform; the terminal seta of the furca equals twice the length of the base and eight times the length of the dorsal seta (Fig. 65).

Male. No male of this species was collected.

Diagnosis. Cypridopsis arhiga, like *C. reptans,* has rudimentary natatory setae on the second antenna, and it is not tumid or spiny like *C. echinatavalva.* This new species has long pore canals along the ventral border of the valve similar to those of *C. subterranea,* but it is a smaller species, the eye is not rudimentary, and the color is not white or yellowish. *C. arhiga* is smaller than *C. reptans,* the valve is not as angular posteriorly, it differs in color, and no teeth can be seen on any terminal spine of the mandibular palp.

Range. Known only from the type locality.

Type Locality. A spring flowing from fissures in the rock of the road cut of Hickman Springs Road about one hundred feet from the Duck River bridge crossing Tennessee Highway 100 in Centerville, Hickman County, Tennessee. Approximately ninety individuals of this species were collected September 9, 1959, and April 6, 1960.

Disposition of Types. The holotypic female and two paratypic females will be deposited in the United States National Museum. Other paratypes will remain in the collection of the author. The holotype is dissected and mounted in glycerin jelly.

The specific name comes from the Greek *arhiga,* meaning "insensible to cold"; so named because the species is apparently a cold water stenotherm.

Cypridopsis herpestica sp. n.
Figs. 66-74

Description of Holotypic Female. The eye is well developed. The shell is tumid in dorsal view, the width equals two-thirds of the length, widest near the middle; it is rounded posteriorly, bluntly pointed anteriorly (Fig. 66). The valve is gently arched dorsally, rounded anteriorly and posteriorly, sinuate ventrally, and concave anterior to the middle. The surface of the valve contains large, shallow pits, has conspicuous marginal hairs and sensory receptors, and pore canals occur along the ventral border. The color is light brown, the height more than one-half the length (Fig. 67). Left valve length 0.57 mm, height 0.32 mm; right valve length 0.55 mm, height 0.29 mm. Shell width 0.40 mm. The first antenna has long natatory setae. The natatory setae of the second antenna are rudimentary, not extending beyond the proximal one-third of the penultimate segment. The sense organ is short, its length equals little more than one-half the width of the segment at the point of its attachment (Fig. 68). Spines on the terminal segment of the mandibular palp are without teeth (Fig. 69). The two spines on the outer masticatory process of the maxilla are plain (Fig. 70). The exopodite plate of the first thoracic leg bears five setae (Fig. 71). The claw of the second thoracic leg is slightly denticulate; the claw length is a little less than the sum of the first, second and third segments of the endopodite. Each of these three segments has a strong distal seta (Fig. 72). The claw of the third leg is flexible, not denticulate (Fig. 73). The furca is greatly reduced, flagelliform; the terminal seta is one and one-third times the length of the base and seven times the length of the dorsal seta (Fig. 74).

Male. No male of this species was collected.

Diagnosis. The rudimentary natatory setae of the second antenna separate this species from most members of the genus. *C. echinatavalva* lacks pits in the valve and possesses spines, and the natatory setae are longer, extending as far as the base of the terminal claws. *C. subterranea, C. reptans* and *C. arhiga* are less tumid, the shell width being approximately one-half the length; they lack pits in the valve, and the shell shape is more angular.

Range. Known only from the type locality.

Type Locality. A spring flowing from the fissures in the rock of the road cut of Hickman Springs Road, approximately one hundred feet from the Duck River bridge crossing Tennessee Highway 100 in Centerville, Hickman County, Tennessee. About three hundred individuals of this species were collected September 9, 1959, and April 6, 1960.

Disposition of Types. The holotypic female and two paratypic females will be deposited in the United States National Museum. Other paratypes will remain in the collection of the author. The holotype is dissected, stained with borax carmine and mounted in diaphane.

The specific name comes from the Greek *herpestica,* meaning "creeping"; so named because of the rudimentary nature of the swimming setae of the second antenna.

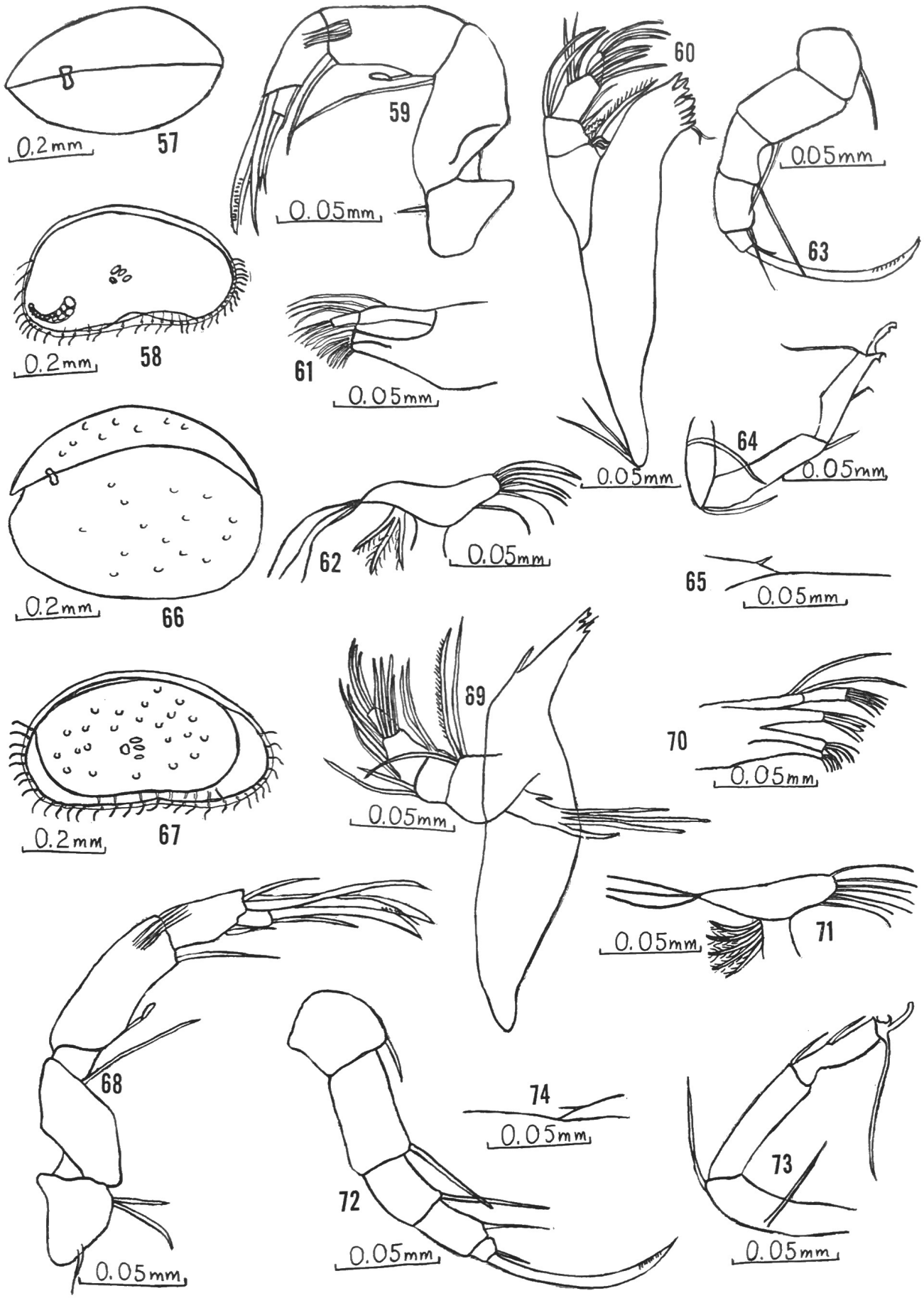
Remarks. Klie (1943) reviewed the previously de-

Figs. 57-65 *Cypridopsis arhiga* sp. n.

Fig. 57 dorsal view of shell
Fig. 58 right valve
Fig. 59 second antenna
Fig. 60 mandible
Fig. 61 masticatory processes and palp of maxilla
Fig. 62 first thoracic leg
Fig. 63 second thoracic leg
Fig. 64 third thoracic leg
Fig. 65 furca

Figs. 66-74 *Cypridopsis herpestica* sp. n.

Fig. 66 dorsal view of shell
Fig. 67 right valve
Fig. 68 second antenna
Fig. 69 mandible
Fig. 70 masticatory processes and palp of maxilla
Fig. 71 first thoracic leg
Fig. 72 second thoracic leg
Fig. 73 third thoracic leg
Fig. 74 furca



Figs. 57-65 **Cypridopsis arhiga** sp. n. Figs. 66-74 **Cypridopsis herpestica** sp. n.

scribed species of the genus *Cypridopsis* with more or less rudimentary natatory setae of the second antenna. In *Cypridopsis albida* (Vávra) 1897 and in *C. minima* Klie 1935 these natatory setae are completely absent and there are two setae on the exopodite plate of the first thoracic leg. Six other species have the natatory setae more or less reduced. *C. brevisetosa* Klie 1943 has only one seta on the exopodite plate of the first thoracic leg. *C. subterranea* Wolf 1919, *C. horai* Klie 1927, *C. clathrata* Klie 1937, and *C. caerulescens* Klie 1939 have bi-radiate exopodite plates and *C. alluaudi* Klie 1935 has six setae on the exopodite plate. *C. compressa, C. reptans* and *C. arhiga,* like *C. obesa* Brady and Robertson 1869, have tri-radiate exopodite plates and *C. herpestica,* like *C. vidua* (O. F. Müller) 1776, has five setae on the exopodite plate. Among the described species of this genus the entire retrogressive sequence is known from six to one seta on this exopodite plate of the first thoracic leg. This report brings to twelve the number of known species of the genus *Cypridopsis* with rudimentary natatory setae of the second antenna.

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* References marked by an asterisk have not been consulted by the author.

NEWS OF TENNESSEE SCIENCE

(Continued from page 131)

University of Wisconsin. As provost of the University of Chattanooga, whose faculty he joined in 1957, Dr. Eberle was responsible for the university's entire educational operation. He also acted as dean of the College of Applied Arts, supervised the university's graduate program, and served as professor of education, giving courses in teacher education and school administration.

Vanderbilt University announces a new graduate program specifically oriented towards a Master's degree in astronomy. The aims of this program are threefold: to prepare candidates with a more substantial basis for continuing toward the Ph.D. degree; to help fill the long-felt needs for observatory personnel in work requiring not the doctorate but rather familiarity with research techniques, instrumentation, and the fundamentals of astronomy at a level considerably beyond that associated with typical undergraduate curricula; and to provide an astronomical background for engineers seeking careers in the field of space science.

Composed of astronomy courses at an intermediate level and practical observational research, the program is oriented toward rendering more meaningful and effective any subsequent research participation or advanced studies the candidate may undertake. Prospective candidates should have strong undergraduate training in physics, engineering-physics, or electrical engineering; and while a background in astronomy is advantageous, it is not essential.

Further information may be obtained from the Director, A. J. Dyer Observatory, Vanderbilt University, Nashville, Tennessee 37203.

New faculty members at Austin Peay State College include: Charles N. Boehms, assistant professor of biology, who holds the B.S. and M.A. degrees from George Peabody College and is returning to APSC as a candidate for the Ph.D. degree from the University of North Carolina; and James M. Brown, instructor in mathematics, who holds the B.A. degree from Austin Peay State College and the M.A. degree from George Peabody College.

Dr. John L. Wood chairman of the department of biochemistry at the University of Tennessee Medical Units in Memphis, will spend a year in Europe doing research under sponsorship of the National Cancer Institute. Dr. Wood will be in the field of sulphur biochemistry, which

(Continued on page 147)