

### A REVIEW OF THE GENUS SCAPHOIDEUS.

By DWIGHT M. DELONG,  
*The Ohio State University, Columbus, Ohio.*

The Genus *Scaphoideus* was erected by Uhler in 1889 (1) to include one species, *immistus*, already described as *fassus* by Say, and three others, *intricatus*, *jucundus* and *consors*, which Uhler described at that time. *S. immistus* Say was cited as the logotype. Although several species were later described by different authors it was not until 1900 that Osborn (2) published the first synoptic treatment of the species of the genus. A second, supplemental treatment, was published (3) in 1911 by the same author. In 1932 (4) Ball described several new genera from *Scaphoideus* and described some new species of this genus. He erected at that time the Genera *Sanctanus*, *Prescottia*, *Osbornellus* and *Portanus*.

Although external morphological characters are of very little value in separating the species of the genus, no attempt had been made to use the internal characters as a basis of specific identification until 1936 (5) (6) when Mohr, Berry, and the author described several species on the basis of studies of the male genitalia.

The present treatment is a result of these studies together with examination of available type material and recent examination of material from several sources.

#### BIBLIOGRAPHY.

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- (3) OSBORN, HERBERT. Ohio Nat. 11 : 249-260. 1911.
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- (5) DELONG, D. M. and MOHR, C. O. Amer. Mid. Nat. 17 : 965-977. 1936.
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The Genus *Scaphoideus* apparently comprises three rather distinct groups if we arrange the species in respect to the general type of male genital structures. The first group, subgenus *Lonenus*, is represented by a single species, *intricatus*, which is characterized by long, rather narrow plates, styles

with long narrow attenuated apices, and by the dorsal portion of the oedagus which is distinctive in type as compared with the other species of the genus. *Cyprius* Ball may belong to this group also, but specimens have not been available for study and its position can not be definitely determined.

A second group, the subgenus *Angenus*, represented by *immistus*, is composed of some thirty described species. This group is characterized by species which possess male plates narrowed but slightly apically, and their apices are broadly rounded. Within the group which is thus designated by the male plates are two rather distinct subgroups based upon the character of the dorsal portion of the oedagus. In one group represented by *immistus* and its allies, the dorsal portion of the oedagus is composed of a long, slender basal portion terminating with a pair of short processes which are usually slightly separated. The other group, represented by *opalinus* and its allies, has a dorsal oedagus process which is shorter, more inflated or bulbous and terminates with a pair of processes which are more widely separated. The anterior process in several species is only a pointed tooth. In the *immistus* group the ventral process is long and slender or may be broadened throughout or at various parts of the process. Also the apical portion may be variously curved, pointed, or enlarged. In the *opalinus* group the ventral portion is usually short and rather narrow. The length may vary with the species.

A third group, the subgenus *Latenus* (the *productus-carinatus* series), is composed of some sixteen species. In 1932 Ball in his discussion of the Genus *Scaphoideus* divided the species of the genus into three groups on the basis of face color. This classification does not agree with either the type of male plates or the type of oedagus presented by the various species, and apparently does not show relationships among the group. Furthermore, Ball placed *carinatus* and *major*—the latter of which he termed *magnus*—as synonyms with *productus*, stating it was “apparently a single very large and distinct species.” Recent studies have indicated that these three species are apparently distinct, and several others only recently named were also confused with them because of similar external appearance.

This latter group (*Latenus*) is characterized by rather short broad plates which are tapered to bluntly pointed or sharply angled apices. Several species of this group are distinct in external and internal characters. *Carinatus* is characterized by a broad oedagus connective and abruptly narrowed male plates. *Chelus* is distinctive by having broad chelate oedagus tips. *Major* and *densus* have short, blunt male plates and straight oedagi. *Cylindratus*, *transeus*, *veterator*, and *elongatus* have rather long plates compared to the other allied species, while *bifurcatus* has a unique central bifurcate oedagus structure.

*Nigricans* is characterized by a short vertex and distinctive black markings, and *ochraceous*, *paludosus*, and *baculus* are orange or reddish orange in color.

The following key, together with the accompanying illustrations, should be of assistance in the identification of most of the species of the genus.

The following species have been omitted from the key:

*S. productus* Osborn. The female type has been examined but no male has been examined which seems to be this species. The female has a very distinctly produced and keeled segment and is apparently a distinct form.

*S. cyprius* Ball is apparently closely related to *intricatus* and for many years was confused with that species by Dr. Ball in his own collection.

*S. atlanticus* Ball has not been examined. It is larger than *immistus* and has the appearance of *Osbornellus auronitens*. It is known from a single holotype male.

*S. titanus* Ball, described as a variety of *immistus*, has not been examined.

*S. incisus* Osborn. The type specimens have been observed and the males which seem to belong with the females are examples of *minor*. It seems, therefore, that the females are variations of female specimens of *minor*.

I am indebted to Professor Herbert Osborn for the opportunity of examining the large number of type specimens in his collection and to Dr. R. H. Beamer who has kindly lent from the Kansas Collection paratypes of *inundatus* Ball, *littoralis* Ball and "compared with type" specimens of *triunatus* Ball. Dr. Carl O. Mohr, Illinois Natural History Survey, has very kindly assisted in the preparation of the illustrations.

SYNONYMY.

A study of the types has indicated that *inundatus* Ball is a synonym of *immistus* Say and that *brevicens* DeLong and Mohr is a synonym of *littoralis* Ball.

KEY TO SPECIES OF SCAPHOIDEUS.

- 1 Male plates almost as long as pygofer, reaching to tip of anal tube, long, narrow, gradually tapered to bluntly pointed apices (*Subgenus Lonenus*).....*intricatus*.
- 1<sup>1</sup> Male plates much shorter, not reaching anal tube..... 2.
- 2 (1<sup>1</sup>) Male plates only slightly narrowed apically, apex broadly rounded, species usually small, narrow, not exceeding 6 mm. in length. (*Subgenus Angenus*).....3.
- 2<sup>1</sup> Male plates broad at base gradually narrowed to inner margin, apex bluntly or sharply angled, species usually larger, robust, exceeding 6 mm. in length. (*Subgenus Latenus*).....24.

- 3 (2) Dorsal process of male oedagus in lateral view with a long slender basal portion, bifurcate at apex, ventral portion usually much longer than dorsal.....4.
- 3<sup>1</sup> Dorsal process of male oedagus shorter, more inflated or bulbous, usually with a pair of small terminal processes, ventral portion shorter than or only slightly exceeding dorsal process.....19.
- 4 (3) Claval area of elytra brown, almost unicolorous, veins inconspicuous, without spots or pale areas.....5.
- 4<sup>1</sup> Claval areas of elytra spotted or with pale areas, veins conspicuous.....6.
- 5 (4) Male oedagus in lateral view broadened at apex and directed dorsally.....*luteolus*.
- 5<sup>1</sup> Male oedagus narrower, pointed at apex and curved slightly ventrally.....*tergatus*.
- 6 (4<sup>1</sup>) Appearing transversely banded, elytra to almost apex of clavus milk white faintly marked with brown. A dark brownish band across apex of clavus, apices of elytra smoky.....*obtusus*.
- 6<sup>1</sup> Elytra not distinctly banded, entirely pale or mottled.....7.
- 7 (6<sup>1</sup>) Elytra pale in color, veins dark, dorsal portion of oedagus with a median tooth between anterior and posterior terminal processes. Ventral portion in lateral view broadened on apical half. Apex curved ventrally and pointed.....*cinerosus*.
- 7<sup>1</sup> Elytra darker in color or with darker markings, without median apical tooth on dorsal portion of oedagus.....8.
- 8 (7<sup>1</sup>) Ventral process of oedagus narrow tapered at apex.....9.
- 8<sup>1</sup> Ventral process of oedagus broader or enlarged at apex or both.....10.
- 9 (8) Ventral oedagus process narrow throughout its length, apically gently curved ventrally.....*immistus*.
- 9<sup>1</sup> Ventral oedagus process enlarged at base of dorsal process, tapered to slender apex, which is strongly curved ventrally.....*camurus*.
- 10 (8<sup>1</sup>) Face pale in color, often marked with dark arcs above.....11.
- 10<sup>1</sup> Face black or smoky bordered with brown or black, dark arcs sometimes concealed by coloration or arcs pale.....15.
- 11 (10) Vertex sharply angled, transverse band on vertex, two on pronotum and one on anterior margin of scutellum dark brown (known only from Arizona).....*triunata*.
- 11<sup>1</sup> Vertex bluntly angled, band on vertex some shade of red or orange, pronotum not distinctly banded.....12.
- 12 (11<sup>1</sup>) Male oedagus enlarged just before bluntly pointed apex.....*auctus*.
- 12<sup>1</sup> Male oedagus not enlarged at apex.....13.
- 13 (12<sup>1</sup>) Male oedagus in lateral view broad throughout, apex broad, abruptly rounded to ventral pointed tooth.....*crassus*.
- 13<sup>1</sup> Male oedagus narrower on apical two-thirds, decidedly broadened at junction of dorsal process, apex more narrowed.....14.
- 14 (13<sup>1</sup>) Male pygofer truncate at apex, oedagus slightly curved downwardly at apex.....*curvatus*.
- 14<sup>1</sup> Male pygofer rounded at apex, oedagus one-fourth longer, more narrowed at apex.....*dilatatus*.

- 15 (10<sup>1</sup>) Face entirely black with a small white spot just below apex, without arcs.....*melanotus*.  
 15<sup>1</sup> Face smoky to brown with conspicuous arcs on upper portion.....16.  
 16 (15<sup>1</sup>) Elytra rather uniformly dark in color, scutellum conspicuously pale, dark only in basal angles.....17.  
 16<sup>1</sup> Elytra with numerous pale markings or areas, scutellum with dark markings other than on basal angles.....18.  
 17 (16) Male oedagus with ventral portion enlarged at junction of dorsal process and again at apex, which is curved ventrally and bluntly pointed.....*pullus*.  
 17<sup>1</sup> Ventral portion of male oedagus almost uniform in size throughout, slightly narrowed on upper surface just before apex, which is obliquely sloping to ventral blunt apex.....*sensibilis*.  
 18 (16<sup>1</sup>) Pygofer blunt, broadly rounded, ventral portion of male oedagus almost uniform in size throughout, apical portion curved ventrally, apex truncate with a pointed ventral projection.....*flexus*.  
 18<sup>1</sup> Pygofer more elongate, bluntly pointed, ventral portion of male oedagus narrowed on median half, apex obliquely sloping with a pointed tooth on upper margin and an elongate, more acutely pointed ventral apex.....*radix*.  
 19 (3<sup>1</sup>) Face black or dark brown with pale arcs beneath vertex margin, dorsal portion of oedagus constricted just before divergent apical processes.....*nigrellus*.  
 19<sup>1</sup> Face pale, often conspicuously yellow with dark arcs.....20.  
 20 (19<sup>1</sup>) Entire dorsal surface pale with veins of elytra dark and a few dark markings on elytra, apex of elytra brown or smoky.....*opalinus*.  
 20<sup>1</sup> Darker in color, brownish or heavily marked with brown.....21.  
 21 (20<sup>1</sup>) Vertex and scutellum conspicuously light, faintly marked, elytra dark brown to black, white commissural spot conspicuous, ventral portion of oedagus very short.....*scelestus*.  
 21<sup>1</sup> Vertex and scutellum darker or more heavily marked, commissural spot on elytra not conspicuously white, ventral portion of oedagus longer.....22.  
 22 (21<sup>1</sup>) Vertex marked with a narrow and faint transverse band, dorsal portion of oedagus gradually broadened to apex, which has a posterior curved finger process.....*amplus*.  
 22<sup>1</sup> Vertex marked with a wider and darker transverse band, dorsal portion of oedagus more abruptly widened at base and with an anterior and posterior tooth or fingerlike process at apex.....23.  
 23 (22<sup>1</sup>) Ventral oedagus process not as long as dorsal process, apex of pygofer rounded.....*littoralis*.  
 23<sup>1</sup> Ventral oedagus process longer than dorsal process. Apex of pygofer more pointed.....*diutius*.  
 24 (2<sup>1</sup>) Orange yellow or orange red in color.....25.  
 24<sup>1</sup> Some shade of brown marked with dark brown or black.....27.  
 25 (24) Smaller, not exceeding 5 mm. in length, vertex almost uniform orange yellow, without median transverse band, margin white with a black marginal line above and another below.....*baculus*.

- 25<sup>1</sup> Larger, more than 6 mm. in length. Vertex white to yellow with an orange transverse band.....26.
- 26 (25<sup>1</sup>) Transverse band with a strongly produced tooth at middle, marginal brown line broad and often interrupted at middle. Apex of elytra narrowly black margined (northern in distribution). *ochraceous*.
- 26<sup>1</sup> Vertex more strongly produced, transverse band only slightly produced at middle, marginal line very narrow, apices of elytra broadly black (known only from Florida).....*paludosus*.
- 27 (24<sup>1</sup>) Oedagus of male with a median process which bears a pair of laterally divergent processes at ventral apex.....*bifurcatus*.
- 27<sup>1</sup> Oedagus of male with a pair of processes but without median process bearing divergent processes.....28.
- 28 (27<sup>1</sup>) Male pygofers unusually long, narrowed and rather sharply pointed apically.....29.
- 28<sup>1</sup> Male pygofers normally produced, rounded or truncated.....30.
- 29 (28) Male oedagus in ventral view with broad processes which bear large chelate-like processes at apices.....*chelus*.
- 29<sup>1</sup> Male oedagus in ventral view with processes which taper to form long, slender, apically curved structures which cross each other.....*elongatus*.
- 30 (28<sup>1</sup>) Male oedagus in lateral view with basal portion decidedly wider than apical portion.....31.
- 30<sup>1</sup> Male oedagus in lateral view with basal portion not wider than apical portion.....32.
- 31 (30) Male plates distinctly constricted near apices and produced as rather broad, tooth-like apical processes, apical portions of oedagus tapered and recurved.....*carinatus*.
- 31<sup>1</sup> Male plates gradually tapered to bluntly pointed apices; oedagus concavely curved at middle, then apical portion convexly curved, tapered, crossed and directed laterally.....*frisoni*.
- 32 (30<sup>1</sup>) Apical processes of male oedagus in ventral view appearing flat, about the same width throughout, evenly curved, rather abruptly narrowed to pointed apices.....33.
- 32<sup>1</sup> Apical processes of male oedagus in ventral view unevenly curved or gradually tapered to more acutely pointed apices or both.....34.
- 33 (32) Size smaller, 6 mm., oedagus processes more narrowed, marginal stripe on vertex narrow, broken at middle.....*augustatus*.
- 33<sup>1</sup> Size larger, 6.5 mm. or more, oedagus processes slightly widened just before being abruptly narrowed at apex. Marginal stripe on vertex broken at middle and widened, almost forming a spot either side.....*merus*.
- 34 (32<sup>1</sup>) Apices of ventral processes of male oedagus in ventral view long, slender, crossing, tips directed laterally.....35.
- 34<sup>1</sup> Apices of ventral processes of male oedagus blunt, or if acutely pointed directed caudally and not crossed at apex.....38.
- 35 (34) Vertex bluntly angled, almost rounded, heavily marked with black, transverse band of vertex black.....*nigricans*.

- 35<sup>1</sup> Vertex more strongly produced, marked with brown, transverse band on vertex some shade of red or orange.....36.
- 36 (35<sup>1</sup>) Male oedagus concavely narrowed either side, causing it to appear constricted at middle.....*veterator*.
- 36<sup>1</sup> Male oedagus not concavely narrowed on outer margin at middle.....37.
- 37 Male oedagus widened near base in ventral view, gradually tapering to long slender apex.....*branseus*.
- 37<sup>1</sup> Basal two-thirds of male oedagus about the same width in ventral view, apical third gradually tapering.....*torqus*.
- 38 (34<sup>1</sup>) Male oedagus with ventral processes in ventral aspect unevenly curved, apices bluntly pointed, male plates long and narrowed.....*cylindratus*.
- 38<sup>1</sup> Ventral processes of male oedagus rather evenly curved, apices acutely pointed, male plates shorter and broader.....39.
- 29 (38<sup>1</sup>) Ventral processes of oedagus enlarged on inner margins about one-third the distance from apex, outer margins straight.....40.
- 39<sup>1</sup> Ventral processes of oedagus not enlarged between base and apex, apical fourth gradually narrowed and curved slightly inwardly to sharply pointed, appressed apices.....*minor*.
- 40 (39) Ventral portion of oedagus one-half longer than connectives. Dorsal oedagus process broad at base and with short, thick apical portion which is rounded at apex and bears a conspicuous dorsal spine.....*densus*.
- 40<sup>1</sup> Ventral portion of oedagus only slightly longer than connectives. Dorsal oedagus process semicircular tapered to apex, which is blunt, slightly enlarged and bearing a small dorsal spine.....*major*.

**Scaphoideus rubranotum**, n. sp.

Resembling *carinatus* in general size and form, but paler in color, markings less intense and with anterior margin of pronotum and disc of scutellum marked with red spots. Length 7.5 mm.

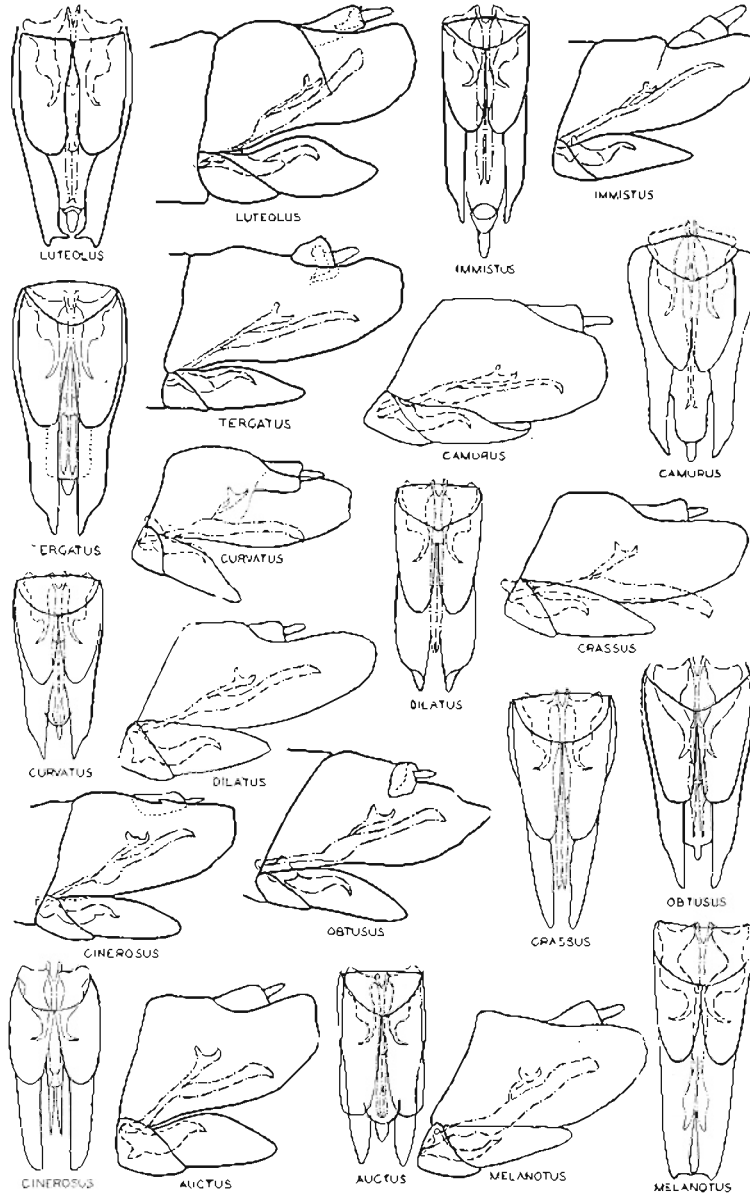
Vertex bluntly angularly produced one-half its length before anterior margins of eyes, slightly wider between eyes than median length.

Color, vertex with a heavy black band just above margin between ocelli and a transverse brown line extending between ocelli with a small tooth produced anteriorly at middle. Pronotum pale brown, anterior margin marked with large red spots. Scutellum with a pair of round red spots on disc, a longitudinal white line either side. Elytra gray to pale brown, veins narrowly marked with brown. Apex of elytra brown. Face with heavy black arcs.

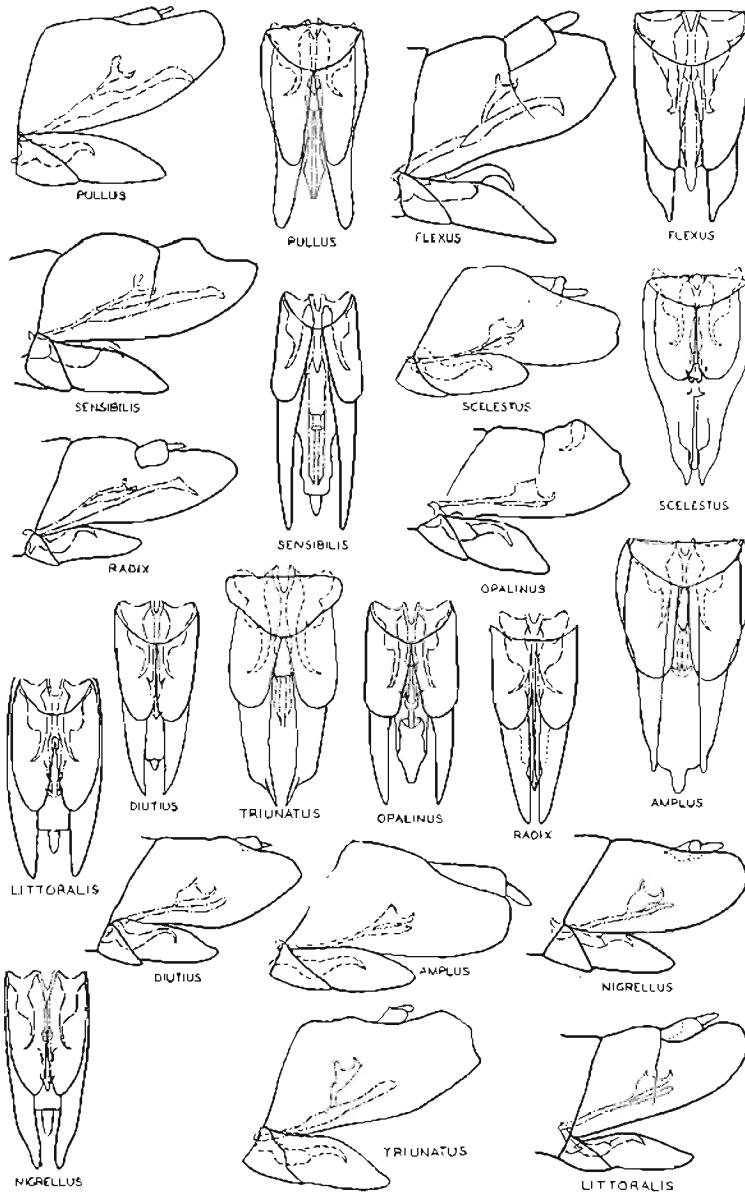
Genitalia: Female last ventral segment keeled at middle, roundedly produced.

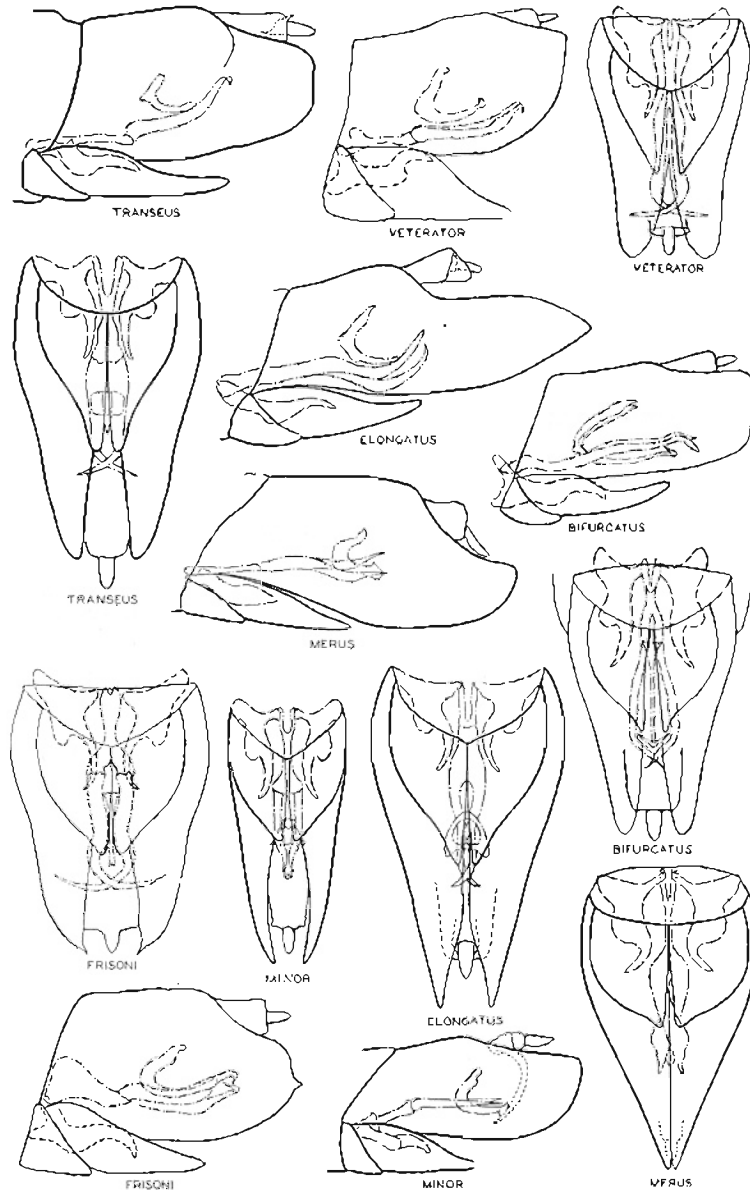
Holotype female and paratype female from Ithaca, N. Y., July 9, 1904, in author's collection.

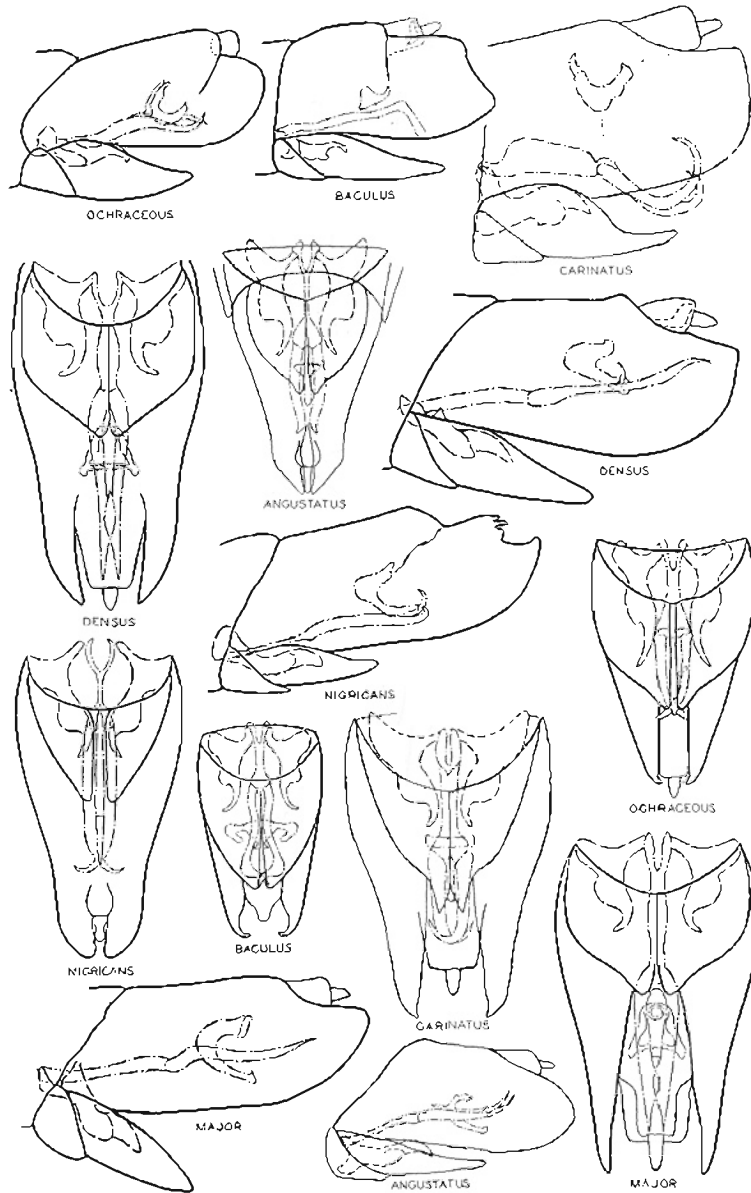
Although it is doubtful whether females should be described without a corresponding male, these two female specimens are described because of their unique color markings.

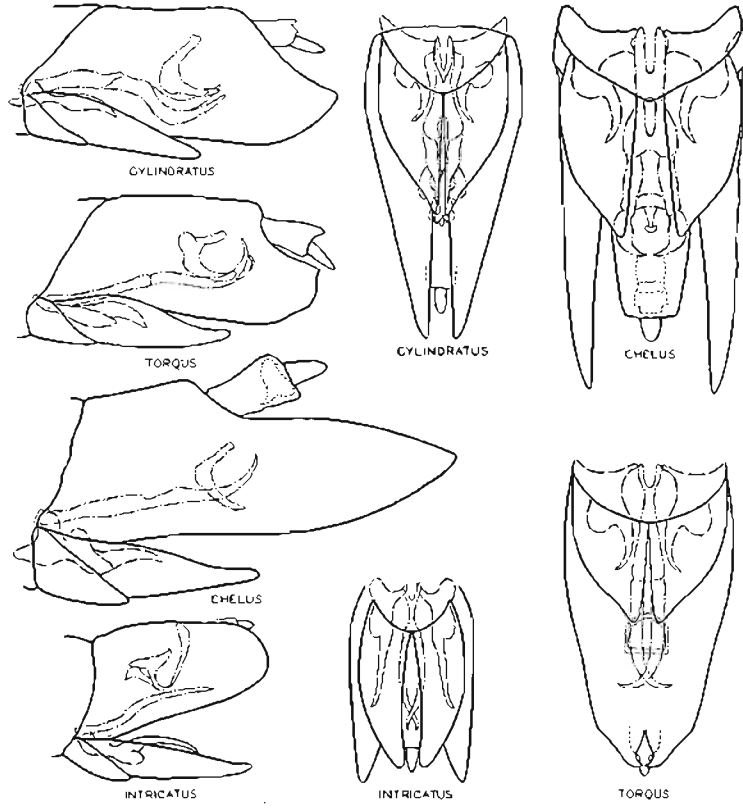












**Scaphoideus tergatus**, n. sp.

Resembling *luteolus* in general appearance but with elytra more mottled and with male oedagus more slender on apical portion and with apex curving ventrally. Length 5.5-6 mm.

Vertex strongly produced, a little longer at middle than width between eyes.

Color: Vertex white, with a very narrow brown marginal line usually slightly interrupted at middle, and a broad testaceous transverse band between anterior margins of eyes, scarcely produced at middle. Pronotum testaceous with a white transverse band on middle. Scutellum testaceous, apical third white with a black spot on either side of apical spine. Elytra dark brown, veins on clavus indistinct, veins on corium and costa brown, apical portion black, very few pale areas. Face pale with two dark arcs.

Genitalia: Female last ventral segment long, apical third of posterior margin produced in a short, broad rounded black tooth. Male oedagus in lateral view with ventral portion narrow, widened at junction of dorsal portion, apex gradually narrowed to pointed tip which is curved slightly ventrally.

Holotype male, allotype female collected at State Forest, Jonesboro, Illinois, July 31, 1934 (DeLong and Mohr), in Illinois Natural History Collection. Female paratypes same date and locality and from Havana, Illinois, August 30, 1917, in Illinois Natural History Survey collection and in the author's collection.

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