

A STUDY OF *BRYOTHINUSA* (COLEOPTERA: STAPHYLINIDAE), COMPARING A TABULAR AND A DICHOTOMOUS KEY TO THE SPECIES

IAN MOORE¹ AND E. F. LEGNER¹

ABSTRACT: Comparison of a tabular with a dichotomous key to the species of *Bryothinusa* demonstrates advantages of the former. *B. rothi* n. sp., Mexico and *B. fluenta* n. sp., Hong Kong are described.

Tabular keys have been in use for a number of years (Newell 1951, 1953, 1957, 1959) but it was not until 1970 that their construction was described in detail. Further improvements in the structure of tabular keys followed (Newell 1972).

Tabular keys have advantages over dichotomous keys in that they are open-ended allowing for easy additions, all desired useful characters of a taxon are expressed, and missing characters do not exclude a taxon from the key. Exceptions within a taxon are easily handled without hindering the function of the key. Tabular keys are useful beyond the function of identification in that they are useful tools in revisional studies, information storage and retrieval, and in communication.

We present here for comparison a dichotomous key and a tabular key to the genus *Bryothinusa*. It is at once apparent that the information content of the tabular greatly exceeds that of the dichotomous key. In the last review of the genus (Moore, Legner, and Chan, 1973) it was necessary to append the dichotomous key by a paragraph for each species detailing characters not mentioned in the key. All of these characters are listed in the tabular key given here and are available by quick scanning.

Further details of the use of tabular keys may be obtained by reference to Newell (1970, 1972).

Bryothinusa was described by Casey (1904) on the basis of a single species, *catalinae*, from the seabeach at low tide in southern California. Casey's original description was inadequate so that when Sawada (1955) described four more species from Japan he placed them in a new genus, *Halasthenus*. Moore (1956) redescribed the genus and the genotype, *catalinae*. Sawada (1971) synonymized *Halasthenus* with *Bryothinusa*, added another Japanese species and synonymized one of his previously described species. Moore and Legner (1971) described a single species from Hong Kong and Moore, Legner, and Chan (1973) reviewed the entire genus and added three additional species from Hong Kong. All species known

through 1973 were from the intertidal ocean. In this paper we add two more species, one intertidal species from the Gulf of California and a fresh water species from a stream in Hong Kong. The latter is remarkable in being the only staphylinid known to us which lives beneath the surface in fresh water.

STATEMENT OF CHARACTERS

1. Ratio of eye length to tempora length = RAT. LEN. TEMP. EYE (1.3 to 8.1)
2. Relative length of tenth antennomere = REL. LEN. 10TH ANTEN.
longer = elongate, longer than wide.
equal = width equals length, as long as wide.
wider = transverse, wider than long.
3. Color of elytra = COL. ELY.
pice = piceus.
ferr = ferrugineus.
4. Ratio of length to width of third segment of maxillary palpus = RAT. LEN. WID. 3 M.P. (2.1 to 5.2).
5. Ratio of length to conjoint width of elytra = RAT. LEN. WID. ELY.
wider = wider than long.
equal = as wide as long.
longer = longer than wide.
6. Total length of insect in mm. = TOTAL LEN. (1.48 to 2.20.).

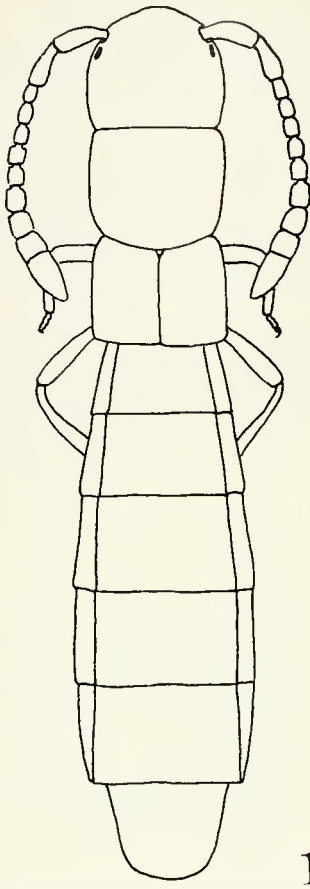
Distribution

CAL. = California.
MEX. = Gulf of California.
H.K. = Hong Kong.
JAP. = Japan.

DICHOTOMOUS KEY TO THE SPECIES OF *Bryothinusa*

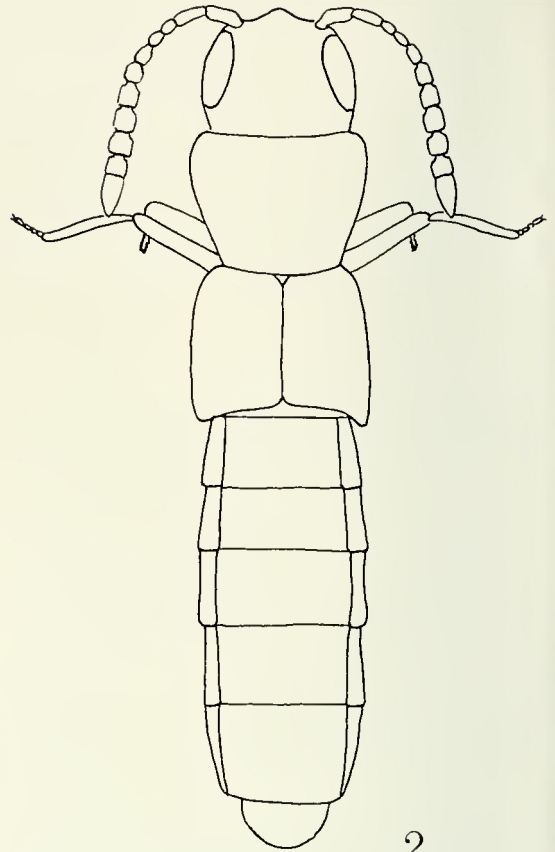
- | | |
|--|---|
| 1. Tenth antennomere longer than wide | 2 |
| Tenth antennomere not longer than wide | 5 |

¹ Div. Biol. Control, Univ. California, Riverside, California 92502.



1

Figure 1. Habitus of *Bryothinusa rothi*, new species.



2

Figure 2. Habitus of *Bryothinusa fluenta*, new species.

- 2. Head concave *catalinae* Casey
Head convex 3
- 3. Tempora as long as eye
..... *sawadai* Moore, Legner, and Chan
Tempora longer than eye 4
- 4. Elytra shorter than pronotum; length 1.50 mm. *minuta* Sawada
Elytra equal in length to pronotum; length 2.50 mm *algarum* Sawada
- 5. Tempora longer than eye 6
Tempora shorter than eye 8
- 6. Tempora five times as long as eye
..... *rothi* New Species
Tempora two times as long as eye 7
- 7. Tenth antennomere quadrate *tsutsuii* Sawada
Tenth antennomere transverse *nakanei* Sawada
- 8. Third segment of maxillary palpus not more than three times as long as wide; tenth antennomere quadrate 9
Third segment of maxillary palpus more than three times as long as wide; tenth antennomere transverse
..... *sinensis* Moore, Legner, and Chan

- 9. Elytra conjointly longer than wide
..... *hongkongensis* Moore, Legner, and Chan
Elytra conjointly wider than longer 10
- 10. Eye three times as long as tempora
..... *fluenta* New Species
Eye two times as long as tempora
..... *chani* Moore and Legner

In *tsutsuii* the tenth antennomere is definitely quadrate, not elongate as stated in previous key in Moore, Legner, and Chan, 1973.

***Bryothinusa rothi*, new species**
Figure 1

Description of holotype.—Color entirely pale ferrugineous except fourth tergite piceus, base of fifth tergite very dark ferrugineous and fourth and fifth sternites infusate.

Head one-sixth wider than long; disc nearly flat, finely reticulate, with a fine short sparse pubescence; eyes very small, of about five or six facets; tempora about five times the length of eye, gently arcuate; surface beneath finely reticulate and pubescent as above. Antennae almost as long as head, pronotum

TABULAR KEY TO THE SPECIES OF *BRYOTHINUSA*

1	2	3	4	5	6				
RAT. LEN. TEMP. EYE	REL. LEN. 10TH ANTEN.	COL. ELY.	RAT. LEN. WID. 3 M.P.	RAT. LEN. WID. ELY.	TOT. LEN. IN MM.	DISTR.	REFERENCE	NAME	
5.1	Equal	ferr	3.1	wider	1.90	MEX.	Holotype	<i>rothi</i>	
3.1	longer	ferr	3.1	wider	2.00	CAL.	Moore 56	<i>catalinae</i>	
8.1	longer	ferr	2.1	wider	1.50	JAP.	Saw. 55, 71	<i>minuta</i>	
5.1	longer	ferr	3.1	wider	2.50	JAP.	Saw. 71	<i>algarum</i>	
2.1	equal	ferr	3.1	wider	2.20	JAP.	Spm.	<i>tsutsuii</i>	
1.1	longer	ferr	3.1	wider	2.00	H.K.	Paratype	<i>sawadai</i>	
1.3	equal	pice	3.1	wider	2.30	H.K.	Holotype	<i>fluenta</i>	
1.2	equal	pice	3.1	equal	2.00	H.K.	Paratype	<i>chani</i>	
1.3	wider	ferr	5.1	wider	2.20	H.K.	Paratype	<i>sinensis</i>	
2.1	wider	ferr	4.1	wider	2.20	JAP.	Saw. 55, 71	<i>nakanei</i>	
1.2	wider	ferr	5.2	longer	1.48	H.K.	Paratype	<i>honkongensis</i>	

and elytra; first segment about three times as long as wide; second segment about as wide as first, about two times as long as wide; third segment narrower than second and a little more than half as long; fourth segment as wide as third and a little shorter; fifth through tenth segments of about equal length but very gradually wider to tenth which is quadrate; eleventh segment as wide as tenth and nearly twice as long, pointed in apical third.

Pronotum about one-fifth wider than long, widest at about apical fourth, base and apex straight, apex a little wider than base, sides gently arcuate, apical angles nearly rectangular, basal angles narrowly rounded; surface reticulation and pubescence very similar to that of head.

Elytra quadrate, slightly narrower and somewhat shorter than pronotum, one-third wider than long, humeri narrowly rounded, sides almost straight to the rectangular outer apical angles, apices nearly straight to the very narrowly rounded inner apical angles; surface reticulation and pubescence as on head.

Abdomen nearly parallel-sided although slightly wider to fifth segment, segments of about equal length; surface reticulation above and beneath much as on the head. Apices of apical tergites and sternites unmodified.

Length 1.90 mm.

Sex unknown.

Puerta Cuevas (29.48° - 112.35°), Sonora, Mexico, September 24-25, 1973, intertidal "probably from beneath rock." Vincent D. Roth and W. Brown collectors. Deposited in American Museum of Natural History, New York.

Remarks.—This species most resembles *minuta* and *algarum* from Japan with its very small eyes but differs from the above in that the tenth antennomere is quadrate rather than elongate. It is

named in honor of one of its collectors, Vincent D. Roth.

Bryothinusa fluenta, new species

Figure 2

Description of holotype.—Color above piceus with the undersurface and femora very dark ferrugineous and the mouthparts, antennae, tibiae and tarsi paler.

Head one-fifth wider than long; disc slightly convex, strongly finely reticulate with a fine short pubescence; eyes very large, occupying three-fourths of side of head; surface sculpture and pubescence beneath much as above. Antennae a little longer than head and pronotum; first segment about three times as long as wide, second segment almost as long and as wide as first, third segment about half as long and slightly narrower than second, fourth through tenth segments each about as long as and slightly wider than the preceding, the tenth quadrate, eleventh two and one-half times as long as tenth, pointed in apical third.

Pronotum about one-third wider than long, widest at apical fifth, apex straight, apical angle almost rectangular; sides gently arcuate, converging to the broadly arcuate apical angles, base gently arcuate, about two-thirds as wide as apex. Surface reticulation and pubescence similar to that of head with the pubescence denser.

Elytra conjointly about as wide as pronotum and one-fifth longer than pronotum, humeri narrowly rounded, sides subparallel but gently arcuate to the narrowly arcuate outer apical angles, apices somewhat oblique to the obtusely rounded inner apical angles; surface reticulation and pubescence as on pronotum.

Abdomen subparallel, widest at fifth tergite, tergites of nearly equal length, reticulation and pubes-

cence above and beneath much as on pronotum. Apices of apical tergites and sternites unmodified.

Length 2.30 mm.

Sex unknown.

New Territory, Hong Kong, fresh water stream about 500 meters from bay shore line in water of zero salinity. Tai-din Chan collector. Deposited in California Academy of Sciences, San Francisco.

Two paratypes with same data as holotype in the collection of the University of California at Riverside.

Remarks.—This species is similar to *sawadai* but has the tenth antennomere quadrate rather than elongate as in that species. The upper surface is entirely piceus whereas ferrugineus is the predominant color in most species of the genus.

The habitat of this species is unique among Staphylinidae. It presumably lives beneath the surface of a fresh water stream a short distance from the seashore. All of the other species of the genus are strictly marine and live in intertidal habitats. *Bryothinusa fluenta* seems to have invaded a fresh water habitat directly from salt water.

LITERATURE CITED

- Casey, T. L. 1904. On some new Coleoptera including five new genera. *Canadian Ent.*, 36: 312–324.
- Moore, I. 1956. A revision of the Pacific Coast Phytosi with a review of the foreign genera. *Trans. San Diego Soc. Nat. Hist.*, 12:103–152.
- Moore, I., and E. F. Legner. 1971. *Bryothinusa chani*, a new species of marine beetle from Hong Kong (Coleoptera: Staphylinidae). *Coleopt. Bull.*, 25:107–108.
- Moore, I., E. F. Legner, and T. Chan. 1973. A review of the genus *Bryothinusa* with descriptions of three new species (Coleoptera: Staphylinidae). *Ent. News*, 84: 73–81.
- Newell, I. M. 1951. Further studies in the Halaridae (Acari). *Amer. Mus. Novits.* 1536:1–56.
- . 1953. The natural classification of the Rhombognathinae (Acari, Halacaridae). *Syst. Zool.*, 2:119–35.
- . 1957. Studies on the Johnstonianidae (Acari, Parasitengona). *Pac. Sci.*, 11:396–466.
- . 1959. Acari. In Ward and Whipple's, *Fresh Water Biology*, Second Edition (W. T. Edmonston, Editor). Chapter 42. John Wiley and Sons, Inc., New York.
- . 1970. Construction and use of tabular keys. *Pac. Insects*, 12:25–37.
- . 1972. Tabular keys, further notes on their construction and use. *Trans. Conn. Acad. Arts Sci.*, 44:259–267.
- Sawada, K. 1955. Marine insects of the Tokara Islands. VIII. Family Staphylinidae (Coleoptera). *Publ. Seto Marine Biol. Lab.*, 5:81–87.
- . 1971. Aleocharinae (Staphylinidae, Coleoptera) from the intertidal zone of Japan. *Publ. Seto Marine Biol. Lab.*, 19:81–109.

Accepted for publication December 26, 1974.