

Fauna of Rajasthan, India. Part 5. Aquatic beetles (Insecta : Coleoptera : Dytiscidae)

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(With 4 Text-figures)

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I—INTRODUCTION

This is a report on the collection of aquatic beetles of the family Dytiscidae from Rajasthan, collected by the Zoological Survey of India parties as indicated below during the years 1941-1960; the author himself was a member of the collecting parties in 1956 and 1958. Recently Baid (1959) recorded three species, namely, *Cybister tripunctatus asiaticus* Sharp, *Eretes sticticus* (Linn.) and *Hyphoporus severini* Regimbart from the Sambhar Lake proper. There does not appear to be any other record of these beetles from Rajasthan. Altogether 22 species belonging to 13 genera are recorded here. Of these, 19 species are recorded from Rajasthan for the first time.

For an account of the topography, climate, vegetation, etc. of Rajasthan, see Part 1 (General Introduction) of this series of papers (Roonwal, 1969, *Rec. Zool. Surv. India*, Vol. 61 (3 & 4), pp. 291—375.

The abbreviation 'ex.' has been used for example or examples as the case may be.

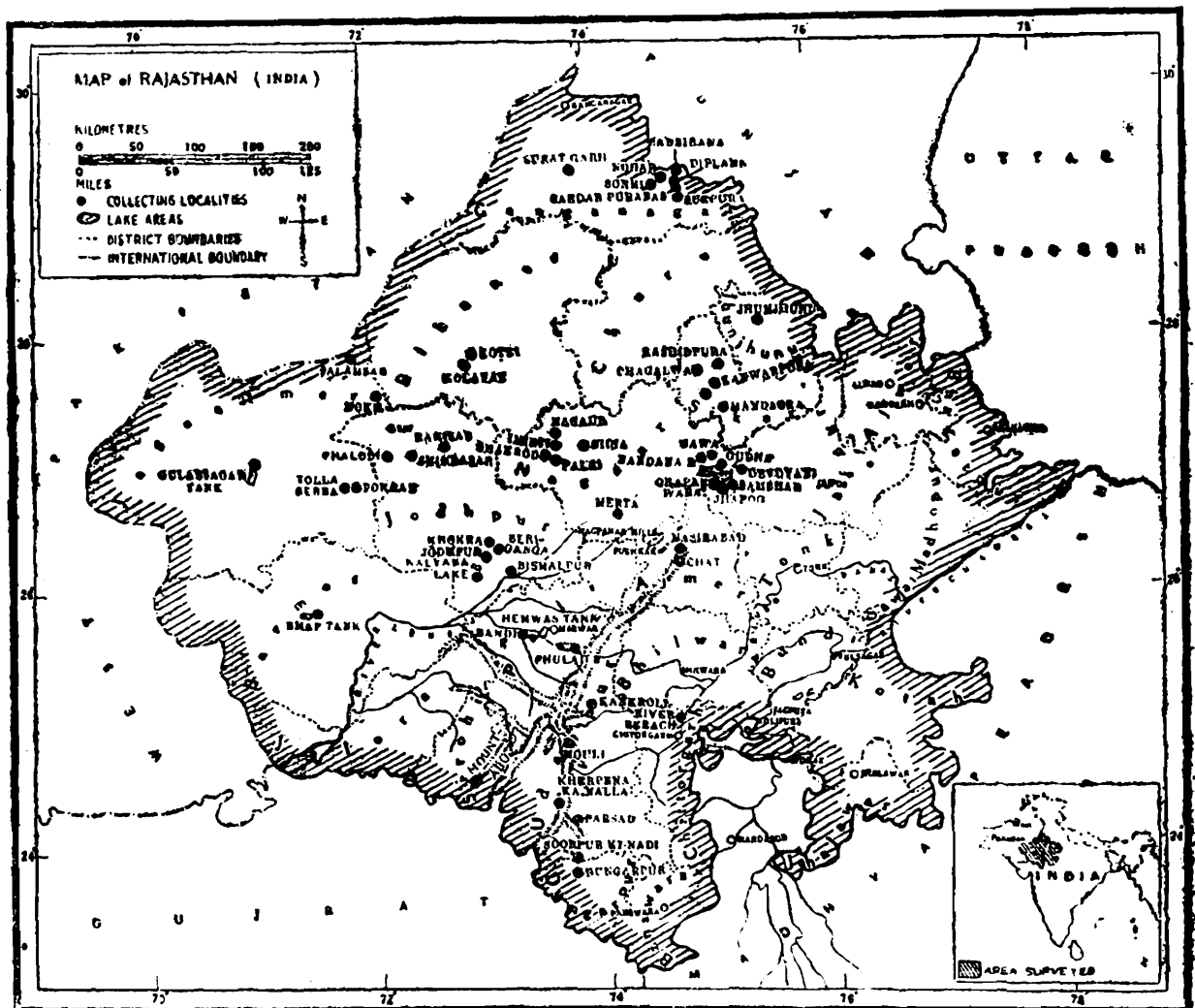
Rec. Zool. Surv. India. 62 (1 & 2) 1970.

(29)

I am grateful to Dr. M. L. Roonwal, Director, Zoological Survey of India, for giving me an opportunity to study the above collections and for his valuable suggestions. My sincere thanks are also due to Dr. A. P. Kapur for his kind encouragement and to my senior colleague Shri K. S. Pradhan for his valuable help in the preparation of the manuscript.

The present account is based on the following collections(Text-fig. 1.) :—

Places visited	Name of Collector and Year of Collection
1. Udaipur and Dungarpur State (Chittorgarh, Barapal, Dungar)	B. N. Chopra and M. L. Roonwal (Oct., 1941).
2. Udaipur, Sirohi and Palanpur States (Mavli, Phulad, Mount Abu, Deesa, Palanpur)	K. S. Pradhan, (Feb.-Mar., 1948).
3. Sambhar Lake, Nawa, Nasirabad, Pali, Merta city	Z. S. I. Party (B. Biswas and T. G. Vazirani) (Nov.-Dec., 1956).
4. Sambhar Lake, within a radius of 16 Km. (ten miles) (Nawa, Jhapog, Phulera, Bahadurpur, Koni)	T. G. Vazirani (Jan.-June, 1958).
5. Sikar District (Rampura, Singaran, Gangara, Malosi, Rashidpura, Dasaki Dhani, Charaubos, Piparali, Choklakabos).	J. S. Bhatti (Nov., 1960).



TEXT-FIG. 1.—Map of Rajasthan, showing the collecting localities for Dytiscid beetles.

II—LIST OF SPECIES

The following species are known from Rajasthan and are discussed in this paper.

Family DYTISCIDAE

Subfamily (i) NOTERINAE

1. *Canthydrus laetabilis* (Walker)

Subfamily (ii) LACCOPHILINAE

2. *Laccophilus chinensis inefficiens* Walker
3. *L. parvulus* Aube
4. *L. flexuosus* Aube
5. *L. sharpi* Regimbart

Subfamily (iii) HYDROPORINAE

6. *Hyphydrus flavicans* Regimbart
7. *Herophydrus musicus* (Klug)
8. *Hydrovatus confertus* Sharp
9. *Guignotus flammulatus* (Sharp)
10. *G. inconstans* (Regimbart)
11. *G. pendjabensis* Guignot
12. *G. pusillus* (Fabricius)
13. *Hyphoporus severni* Regimbart
14. *H. kempi* Gschwendtner
15. *H. nilghiricus* Regimbart

Subfamily (iv) COLYMBETINAE

16. *Rhantus taprobanicus* Sharp

Subfamily (v) DYTISCIANAE

17. *Eretes sticticus* (Linnaeus)
18. *Hydaticus fabricii* Macleay
19. *H. luczonicus* Aube
20. *Rhantaticus congestus* (Klug)
21. *Sandracottus dejeani* (Aube)
22. *Cybister tripunctatus asiaticus* Sharp

III—SYSTEMATIC ACCOUNT

Key to subfamilies of family Dytiscidae

- | | |
|--|---------------|
| 1. Scutellum invisible | 2 |
| Scutellum visible | 4 |
| 2. Fourth segment of the pro-and meso-tarsi much reduced, hardly visible. Prosternal process arched and oblique | Hydroporinae |
| Fourth segment of the pro-and meso-tarsi not reduced, subequal to the third tarsal segment. Prosternal process straight, occasionally a little depressed | 3 |
| 3. Posterior legs with two tarsal claws of equal length ; sides of the pronotum rebordered | Noterinae |
| Posterior legs with a single(thick) tarsal claw ; sides of the pronotum not rebordered | Laccophilinae |
| 4. Anterior border of the eyes excised ; three basal segments of the pro-tarsi enlarged but not forming a large palette | Colymbetinae |
| Anterior border of the eyes not excised ; three basal segments of the pro-tarsi enlarged into rounded, oval or sub-triangular palette | Dytiscinae |

Subfamily NOTERINAE

Key to the tribes and Indian genera

- | | |
|--|------------------------------------|
| 1. No curved spurs on the apex of the pro-tibiae | Notomicrini (<i>Hydrocoptus</i>) |
| Curved spurs on the apex of the pro-tibiae present | 2 |
| 2. Prosternal process rounded behind ; meta-femora usually without ciliae | Noterini (<i>Neterus</i>) |
| Prosternal process truncate behind ; meta-femora with long ciliae ; meta-coxal cavities contiguous | 3 Hydrocantini |
| 3. Prosternal process very broad ; meta-tibiae also very broad, size 4- 7mm. | <i>Hydrocanthus</i> |
| Prosternal process moderately broad ; meta-tibiae rather slender ; size less than 4 mm. | <i>Canthydrus</i> |

Genus 1. *Canthydrus*1. *Canthydrus laetabilis* (Walker)

1858. *Hydroporus laetabilis* Walker, *Ann. Mag. nat. Hist.*, London, 2(3), p. 205.

1920. *Canthydrus laetabilis* : Zimmermann, *Coleopt. Catal. Junk.*, Berlin, 4, p. 11.

Material.—39 ex. as follows :—Nasirabad, 28. xi. 1956, 1 ex. ; Pali 6. xii. 1956, Stn. 20, 20 ex. ; Bahadurpur, 27. iv. 1958, 2 ex. ; Sambhar Lake, 28. iii. 1958, 6 ex. ; 27. iv. 1958, 2 ex. ; On road to Naraina from Sambhar Lake, 23. iii. 1958, 7 ex.

Remarks.—The species has been previously recorded in India from Madras, Konbir and Mandar (Bihar) and also from Ceylon (Colombo) and Burma. It generally occurs along with *C. luctuosus* (Aube).

Subfamily LACCOPHILINAE

Key to the Indian Genera

1. Prosternal process simple ; posterior angles of the pronotum not directed backwards *Laccophilus*
- Prosternal process tridentate ; posterior angles of the pronotum acute, directed backwards and closely fitting the elytra *Neptosternus*

Genus 2. *Laccophilus*

Key to the species known from Rajasthan

1. Elytral markings consisting of small irrotations in the form of checker board ; sub-basal fascia of the elytra with six pallid radiating lines towards the base *chinensis inefficiens*
- Elytral markings consisting of longitudinal undulating lines 2
2. Elytral markings flexuosus, excessively irregular covering the whole surface, except the lateral margins *flexuosus*
- Elytral markings with zig-zag double clear lines, some times becoming thick and coalescent 3
3. Elytra with zig-zag double lines, markings generally thick and coalescent ; penis as seen in fig. 1a *parvulus*
- Elytra with zig-zag lines not coalescent ; penis as seen in fig. 1b *sharpi*

2. *Laccophilus chinensis inefficiens* Walker

(Text-fig. 2d)

1858. *Laccophilus chinensis* Boheman, *K. Sv. Fregatten Eugenies Resa, ... Zoologi*, 1, Insecta, Stockholm, 2, p. 21.
1859. *Laccophilus inefficiens* Walker, *Ann. Mag. nat. Hist.*, London, 3(3), p. 51.
1920. *Laccophilus chinensis* var. *inefficiens* : Zinnemann, *Coelopt. Catal*, Junk, Berlin, 4, p. 17.

Material.—3 ex. as follows :—Pali, 6. xii. 1956, 1 ex. ; Nawa, 15. xi. 1956, 2 ex.

Remarks.—*L. inefficiens* was described by Walker (*t.c.*) from Ceylon. Regimbert (1899) considered it to be a variety of *L. chinensis* (type-locality : China). The nominotypical form has so far been recorded only from China and the var. *inefficiens* is confined to Ceylon, India and Burma. *L. inefficiens* is considered here as a subspecies on the basis of geographical isolation from the nominotypical form. The penis is figured here (Text-fig. 2*d*). In India it has been previously recorded from Mandar and Konbir (Bihar) and the Ghats.

3. *Laccophilus parvulus* Aube

(Text-fig. 2*a*)

1838. *Laccophilus parvulus* Aube, in Dejean's *Species Coleopteres*, Paris, 6, p. 429.

1920. *Laccophilus parvulus* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, 4, p. 24.

Material.—35 ex. as follows :—Pali, 6. xii. 1956, 4 ex. ; Nawa, 15. xi. 1956, 20 ex. ; Sikar Dist., 8. xi. 1956, 1 ex. ; Sikar Dist., 13. xi. 1960, 3 ex. ; Sikar Dist., 13. xi. 1960, 1 ex. ; Sambhar Lake, Gudha, 30. i. 1958, 2 ex. ; Nasirabad, 28. xi. 1956, 4 ex.

Remarks.—The species was originally described from Sumatra and is very variable in the character of the elytral markings. The penis (Text-fig. 2*a*), however, affords a more reliable character for identification. It is widely distributed in Ceylon, India, Burma, Thailand, Sumatra, Malaya (Singapore), Cochin-China, Annam and Celebes. In India it has been recorded from Pondicherry, Tetara, Mandar and Konbir.

4. *Laccophilus flexuosus* Aube

(Text-fig. 2*c*)

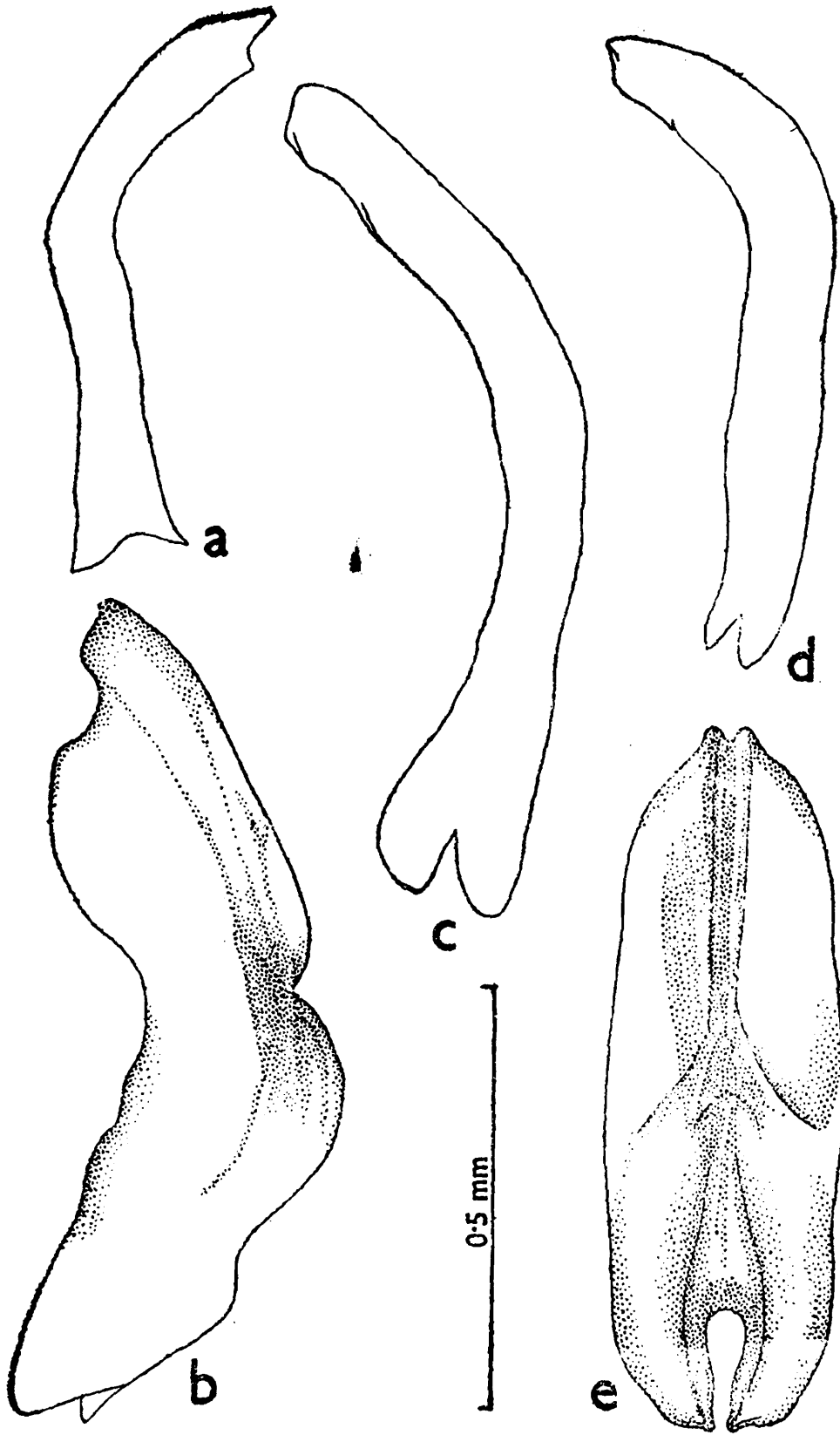
1838. *Laccophilus flexuosus* Aube, in Dejean's *Species Coleopteres*, 6, p. 430.

1920. *Laccophilus flexuosus* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, 4, p. 18.

1959. *Laccophilus flexuosus* : Guignot, *Bull. mens. Soc. Linn., Lyon*, Lyon, 28, p. 11.

Material.—49 ex. as follows :—Sambhar Lake, 12. xii. 1956, 5 ex. ; 22. xi. 1956, 5 ex. ; Nasirabad, 28. xi. 1956, 6 ex. ; Pali, 6. xii. 1956, 3 ex. ; Merta City, 26. xii. 1956, 1 ex. ; 27. xii. 1956, 3 ex. ; 28. xii. 1956, 16 ex. ; 31. xii. 1956, 6 ex. ; Phulera, 11. iii. 1958, 1 ex. ; Bahadurpur, 27. iv. 1958, 2 ex. ; Gudha, 30. i. 1958, 1 ex.

Remarks.—It inhabits all places, viz., ponds, tanks, pools, river beds, etc. Its known distribution is, India (Bombay, Konbir, Mandar, Tetara, Mettur Dam) ; W. Pakistan ; Burma. The penis (Text-fig. 2c) is more evenly curved from the base to the apex than in *L. parvulus* or *L. chinensis inefficiens*.



TEXT-FIG. 2.—Lateral view of penis of : (a) *Laccophilus parvulus* ; (b) *L. sharpi* ; (c) *L. flexuosus* ; (d) *L. chinensis inefficiens*, and (e) *Rhantaticus congestus* (Dorsal view).

5. *Laccophilus sharpi* Regimbart

(Text-fig. 2b)

1882. *Laccophilus flexuosus* Sharp *nec* Aube, *Sci. Trans. R. Dublin Soc.* Dublin, 2, p. 310. (In part.)
1889. *Laccophilus sharpi* Regimbart, *Ann. Soc. ent. Fr.*, Paris, (6)9, p. 151.
1920. *Laccophilus sharpi*: Zimmermann, *Coleopt. Catal. Junk.*, Berlin, 4, p. 26.
1959. *Laccophilus sharpi*: Guignot, *Bull. mens. Soc. Linn. Lyon.* Lyon, 28, p. 11.

Material.—50 ex., as follows :—Sambhar Lake, 12. xi. 1956, 7 ex. ; 22. xi. 1956, 5 ex. ; Nawa, 15. xi. 1956, 10 ex. ; Nasirabad, 28. xi. 1956, 1 ex. ; Pali, 5. xii. 1956, 1 ex. ; 6. xii. 1956, 5 ex. ; Merta-city, 31. xii. 1956, 1 ex. ; 27. xii. 1956, 1 ex. ; Gudha, 30. i. 1958, 2 ex. ; Bangadh, -. iii. 1958, 3 ex. ; On road to Naraina from Sambhar Lake, 23. iii. 1958, 1 ex. ; Phulera, 11. iii. 1958, 2 ex. ; On road to Dudu from Sambhar Lake, 11. iv. 1958, 5 ex. ; Bahadurpur, 27. vi. 1958, 6 ex.

Remarks.—This species is widely distributed in W. Pakistan, India, Burma, China, Cochin-China, Japan, Sumatra, Java, New Guinea and Australia. The elytral markings being quite variable, the structure of the penis (Text-fig. 2b) helps considerably in the identification.

Subfamily *HYDROPORINAE**Key to the tribes and genera known from India*

- | | |
|--|-----------------------------------|
| 1. Prosternal process much deflected from the general direction of the prosternum ; protarsi usually with 4 segments | 2 |
| Prosternal process little deflected from the general direction, protarsi with 5 segments | Methlini (<i>Methles</i>) |
| 2. Claws of the metatarsi mostly unequal, the external claw nearly invisible | 5 Hyphidriini |
| Claws of the metatarsi equal | 3 |
| 3. Prosternal process broadened at the apex ; sutural angles of the elytra acuminate | Hydrovatini (<i>Hydrovatus</i>) |
| Prosternal process not broadened at the apex | 4 |
| 4. Pronotum marked with a latero-basal striae on both the sides, pronotal striae generally continued on the elytra | 6 Bidessini |
| Pronotum not marked with any striae on both the sides | 9 Hydroporini |
| 5. Prosternal process oblong ; size more than 2 mm. | <i>Hyphydrus</i> |
| Prosternal process lanceolate lobate, the apex rounded, not acuminate ; size approx. 2 mm. | <i>Microdytes</i> |

6. Head with a fine* transverse cervical stria	7
Head without a transverse cervical stria	9
7. Epipleurae excavated at base, forming a cavity delimited by a margin, more rarely a simple ridge. Epistome with front edge raised. Pronotal striae well developed	<i>Clypeodytes</i>
Epipleurae at base not excavated and without a ridge delimiting a basal cavity	8
8. Elytra with longitudinal costae, rarely indistinct	<i>Yola</i>
Elytra without longitudinal costae, but with a sutural striae	<i>Bidessus</i>
9. Elytra with sutural striae	<i>Guignotus</i>
Elytra without a sutural striae	<i>Uvarus</i>
10. Base of the epipleurae with an oblique cavity	11
Base of the epipleurae without any oblique cavity	14
11. Clypeus not rebordered in front	<i>Coelambus</i>
Clypeus rebordered in front	12
12. The rebordered clypeus not interrupted in the middle	<i>Hygrotus**</i>
The rebordered clypeus interrupted in the middle	13
13. Basal portion of the epipleurae very narrow, humeral area limited behind by a well marked raised line ; metacoxal cavities approximate	<i>Herophydrus</i>
Basal portion of the epipleurae not so narrow, humeral area not limited behind by a well marked raised line ; metacoxal cavities well separated	<i>Hyphoporus</i>
14. Posterior border of the metacoxal processes straight lined	15
Posterior border of the metacoxal processes notched in the middle or on the sides	16
15. Elytra with longitudinal carina	<i>Peschetius</i>
Elytra without longitudinal carina	<i>Hydroporus</i>
16. Punctuation of the elytra double	<i>Deronectes</i>
Punctuation of the elytra simple	<i>Potamonectes</i>

*This cervical stria runs completely across the vertex of the head from the hind edge of the compound eye to the hind edge of the other.

**Not known from India.

Genus 3. **Hyphydrus**6. **Hyphydrus flavicans** Regimbart

1892. *Hyphydrus flavicans* Regimbart, *Ann. Soc. ent. Bclg.*, Brussels **36**, p. 115.

1920. *Hyphydrus flavicans* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, **4**, p. 40.

Material.—14 ex. as follows :—Palanpur, Banas river, 15. iii. 1948, 1 ex. ; Sambhar Lake, 20. xi. 1956, 1 ex. ; 22. xi. 1956, 1 ex. ; Merta-city, 31. xii. 1956, 1 ex. ; Phulera, 11. iii. 1948, 1 ex. ; Bahadurpur, 27. iv. 1958, 3 ex. ; Bangadh, 1958, 2 ex. ; Gudha, 15. v. 1958, 3 ex. ; Jhapog, 15. v. 1958, 1 ex. ; Koni, 24. v. 1958, 1 ex.

Remarks.—This species was originally described from Konbir-Nowatoli, Chota-Nagpur (Bihar), and subsequently recorded by Regimbart (1899) from Vedantagal, South Arcot and Pondicherry. The present record from Rajasthan extends its distribution westwards. The species is closely related to *H. lyratus* Swartz (a widely distributed species in South-East Asia) in having a small spine on the first abdominal sternite directed backwards and two small tubercles on the apical sternite (in males). The two species also resemble each other in having elongate depression in the middle of the lateral side of each elytron. Apart from the range of distribution, *flavicans* is smaller in size and more oval ; the colouration is entirely reddish, being darker in *lyratus*. The clypeus is also less rounded and more finely rebordered and the contour of the sides of the pronotum is more continued with the elytral shoulders.

Genus 4. **Herophydrus**7. **Herophydrus musicus** (Klug)

1833. *Hydroporus musicus* Klug, *Symbolae Physicae*, Berlin, **4**, p. 33, fig. 12.

1920. *Herophydrus musicus* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, **4**, p. 74.

Material.—22 ex. as follows :—Sambhar Lake, 12. xi. 1956, 1 ex. ; 20. xi. 1956, 3 ex. ; 22. xi. 1956, 1 ex. ; 30. i. 1958, 1 ex. ; Nawa, 15. xi. 1956, 3 ex. ; Nasirabad, 28. xi. 1956, 1 ex. ; Pali, 5. xii. 1956, 1 ex. ; 6. xii. 1956, 2 ex. ; Merta-city, 27. xii. 1956, 1 ex. ; 31. xii. 1956, 4 ex. ; Phulera, 11. iii. 1958, 2 ex. ; Jhapog, 1. iii. 1958, 1 ex. ; Mount Abu, 7. iii. 1948, 1 ex.

Remarks.—This species has been recorded from Mandar (Bihar), by Regimbart (1899), and from Nepal by Gschwendtner (1935). The world distribution extends westwards to Turkistan, Egypt and Iraq. The elytral pattern, which according to Regimbart (1899) consists of five longitudinal black lines, is variable in that the lateral-most line is occasionally wanting in some examples while in others the fourth line is often abridged and represented by a small lateral line in the middle.

Genus 5. **Hydrovatus**

8. **Hydrovatus confertus** Sharp

1882. *Hydrovatus confertus* Sharp, *Sci. Trans. R. Dublin Soc.*, Dublin, 2, p. 329.

1920. *Hydrovatus confertus* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, 4, p. 32.

Material.—2 ex. as follows :—Pali, 5. xii. 1956, 1 ex. ; 6. xii. 1956, 1 ex.

Remarks.—Originally described from Siam, the species has been recorded in India from Konbir-Nowatoli, Tetara, Pondicherry and Mettur Dam. Its range of distribution includes Ceylon, Burma, Siam, Cochin-China, Java, Sumatra and Borneo. This species is often confused with *fractus* Sharp in which the sides of the pronotum are more parallel and thus the humeral region of the elytra bulges out a little in contour ; further, in the male the antennal segments in the middle are slightly dilated in this species.

Genus 6. **Guignotus**

Key to the species known from Rajasthan

- | | |
|--|---------------------|
| 1. Species without any elytral markings | <i>inconstans</i> |
| Species with elytral markings | 2 |
| 2. Each elytron with two longitudinal brown markings terminating at the apex in the form of a crochet on the external side | <i>pendjabensis</i> |
| Elytral markings different | 3 |
| 3. Pronotal striae oblique, not continued on the elytra | <i>flammulatus</i> |
| Pronotal striae oblique, continued on the elytra | <i>pusillus</i> |

9. **Guignotus flammulatus** (Sharp)

1882. *Bidessus flammulatus* Sharp, *Sci. Trans. R. Dublin Soc.*, Dublin, 2, p. 359.

1892. *Bidessus antennatus* : Regimbart, *Ann. Soc. ent. Belg.*, Brussels, 36, p. 118.

1920. *Bidessus flammulatus* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, 4, p. 51.

1959. *Guignotus flammulatus* : Guignot, *Bull. mens. Soc. Linn. Lyon*, Lyon, 28, p. 9.

Material.—37 ex. as follows :—Sambhar Lake, 10. xi. 1956, 1 ex. 12. xi. 1956, 5 ex. ; Nawa, 15. xi. 1956, 5 ex. ; 16. xi. 1956, 2 ex. ; Nasirabad, 29. xi. 1956, 17 ex. ; Pali, 6. xii. 1956, 4 ex. ; Merta-city, 31. xii. 1956, 1 ex. ; Bahadurpur, 27. iv. 1958, 1 ex. ; Sikar Dist., 15. xi. 1960, 1 ex.

Remarks.—This species was described from China. Till recently the Indian specimens were referred *antennatus* Regimbart, but Guignot (1959) synonymised it with *flammulatus*. In India it has been so far recorded from Konbir-Nowatoli, Mandar. It also occurs in W Pakistan, Tonkin and China.

10. *Guignotus inconstans* (Regimbart)

1882. *Bidessus intermixtus* Sharp, *Sci. Trans. R. Dublin Soc.*, Dublin, **2**, p. 358 (nec. *Hydroporus intermixtus* Walker, 1858, p. 204).
 1892. *Bidessus inconstans* : Regimbart, *Ann. Soc. ent. Belg.*, Brussels, **36**, p. 119.
 1895. *Bidessus inconstans* : Regimbart, *Ann. Soc. ent. Fr.*, Paris, **64**, p. 344.

Material.—3 ex. as follows :—Nasirabad, 29. xi. 1956, 2 ex. ; Pali, 1 ex. ; Stn. 24, 24. xii. 1956, Merta-city, 31. xii. 1956, 1 ex.

Remarks.—The present specimens have been determined by comparison with the specimens from Rambha (Ganjam Dist., Orissa) and determined by Gschwendtner. They are distinctly though sparsely pubescent, a point not mentioned in the description. The discal striae are subequal to the pronotal striae, while Regimbart (1899) described it as most briefly continued on the elytra. The species has been recorded from Ceylon, India (Ghates, Konbir-Nowatoli, Mandar) and doubtfully from Sumatra (*vide* Sharp, 1882).

There has been an error in some earlier identification of this species. Sharp, 1882, p. 358, wrongly believed *Hydroporus intermixtus* Walker, 1858, to be a *Bidessus*. Regimbart, 1899 followed Sharp, 1882, in placing his own *inconstans* of 1892 and 1895 as a synonym of *intermixtus* Walker, *sensu* Sharp. Balfour-Browne, 1936 has pointed out that *Hydroporus intermixtus* Walker is in fact a *Hyphydrus*. It followed logically that *inconstans* Regimbart, 1892, is both available and valid.

11. *Guignotus pendjabensis* Guignot

1954. *Guignotus pendjabensis* Guignot, *Opusc. ent.*, Lund., **19**, p. 22.

Material.—20 ex. as follows :—Sambhar Lake, 21. xi. 1956, 1 ex. ; 22. xi. 1956, 1 ex. ; 12. xi. 1956, 3 ex. ; Nawa, 15. xi. 1956, 5 ex. ; 16. xi. 1956, 2 ex. ; Nasirabad, 28. xi. 1956, 2 ex. ; Pali, 6. xii. 1956, 4 ex. ; Bahadurpur, 27. iv. 1958, 1 ex. ; Gudha, 19. v. 1958, 1 ex.

Remarks.—This species extends from W Pakistan to India. In India it is now being reported from Rajasthan from the areas mentioned above.

12. *Guignotus pusillus* (Fabricius)

1781. *Dytiscus pusillus* Fabricius, *Species Insectorum*, Hamburgi & Kilonii, **1**, p. 297.
 1792. *Dytiscus geminus* Fabricius, *Entomologia Systematica*. Hafniae, **1**, p. 199.
 1935. *Bidessus geminus* : Gschwendtner, *Rec. Indian Mus.*, Delhi, **37**, p. 374.
 1947. *Guignotus pusillus* : Guignot, *Faune de France*, Coleopteres, Hydrocanthares, Paris, **48**, pp. 66-67.

Material.—44. ex. as follows :—Sambhar Lake, 12. xi. 1956, 4 ex. ; 20. xi. 1956, 1 ex. ; 21. xi. 1956, 1 ex. ; 22. xi. 1956, 1 ex. ; 27. iv. 1958, 1 ex. ; Nawa, 15. xi. 1956, 6 ex. ; 16. xi. 1956, 4 ex. ; Nasirabad, 29. xi. 1956, 2 ex. ; Pali, 6. xii. 1956, 6 ex. ; 5. xii. 1956, 1 ex. ; Merta-city, 31. xii. 1956, 13 ex. ; Bahadurpur, 27. iv. 1958, 1 ex.

Remarks.—This is a predominantly palaeartic species, being distributed in India in Kashmir and Simla hills. Various forms have been described on the basis of size and elytral markings. The elytral markings present in the above collection vary from the obsolete pattern to the very distinct ones of the forma *typica* and forma *geminus*.

Genus 7. *Hyphoporus*

Key to the species known from Rajasthan

1. Punctuation on the head moderately strong and close, on the pronotum stronger than on the head and elongately confluent on the posterior-half of the pronotum in males *nilghiricus*

- Punctuation on the head fine and remote, on the pronotum a little stronger than on the head but not confluent in males 2

2. Size 5-5.5 mm. long. Elytra rather irregularly punctate, interstices between punctures without any fine punctures, penis as seen in fig. 3a *severini*

- Size 4.5-4.75 mm. long. Elytra rather irregularly punctate, penis as seen in fig. 3c. *kempi*

13. *Hyphoporus severini* Regimbart

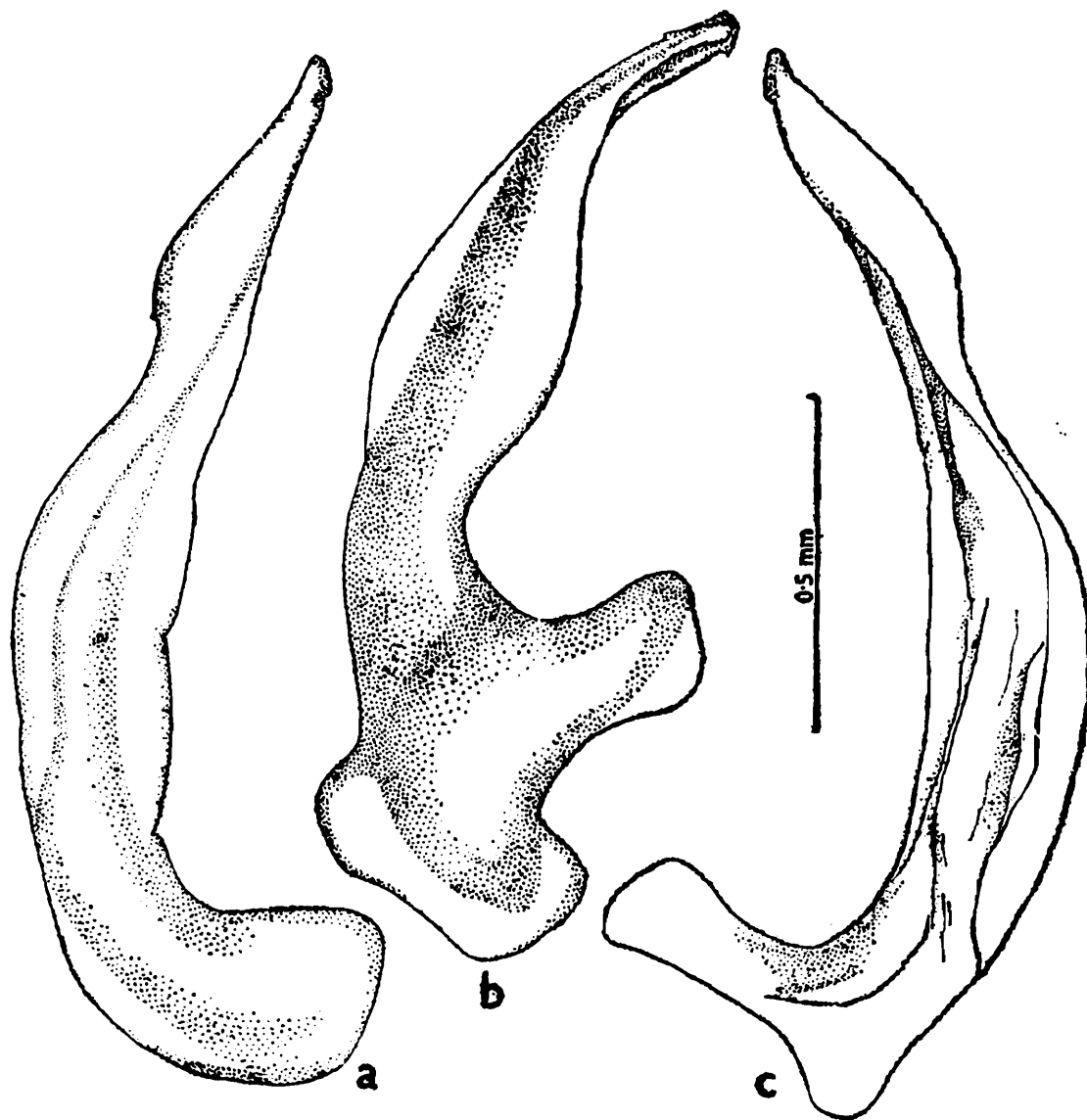
(Text-fig. 3a)

1892. *Hyphoporus severini* Regimbart, *Ann. Soc. ent. Belg.*, Brussels, 36, p. 115.

1920. *Hyphoporus severini* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, 4, p. 73.

Material.—41 ex. as follows :—Sambhar Lake, 20. xi. 1956, 3 ex. ; Nawa, 15. xi. 1956, 1 ex. ; Jhapog, 1. iii. 1958, 1 ex. ; Bangadh, 1958, 4 ex. ; Sambhar Lake, 10. iii. 1958, 2 ex. ; Phulera, 11. iii. 1958, 5 ex. ; On road to Dudu from Sambhar Lake, 11. iv. 1958, 4 ex. ; 6. vi. 1958, 1 ex. ; Bahadurpur, 27. iv. 1958, 8 ex. ; Gudha, 13. v. 1958, 1 ex. ; Nawa, 19. v. 1958, 1 ex. ; Koni, 24. v. 1958, 5 ex. ; Mount Abu, 8. iii. 1948, 3 ex. ; 7. iii. 1948, 2 ex.

Remarks.—It has been previously recorded from Konbir (Bihar), Moradabad (U. P.), Assam and Sylhet (E. Pakistan). The species is closely related to *H. kempi* Gschw. in the structure of the male genitalia (Text-fig. 3c) but can be easily distinguished by its larger size and more oval body.



TEXT-FIG. 3.—Lateral view of penis of : (a) *Hyphoporus severini* ; (b) *H. nilghiricus* ; and (c) *H. kempi*.

14. *Hyphoporus kempi* Gschwendtner

(Text-fig. 3c)

1935. *Hyphoporus kempi* Gschwendtner, *Rec. Indian Mus.*, Delhi, 37, pp. 368-369.

Material.—26 ex. as follows :—Sambhar Lake, 20. xi. 1956, 17 ex. Nawa, 15. xi. 1956, 1 ex. ; Pali, 6. xi. 1956, 2 ex. ; Sambhar Lake, 30. i. 1958, 2 ex. ; 11. iv. 1958, 1 ex. ; Phulera, 11. iii. 1958, 2 ex. ; Gudha, 19. v. 1958, 1 ex.

Remarks.—This species was described by Gschwendtner from specimens from Assam (4♂♂) and Lucknow (1♀). The present record extends its distribution westwards. In the structure of its penis (Text-fig. 3c) it comes close to *H. severini* but is slightly more curved and the two differ in the asymmetrical nature of the lateral sides of penis. This species is also a little smaller in size and less oval than *H. kempi*.

15. *Hyphoporus nilghiricus* Regimbart

(Text-fig. 3b)

1903. *Hyphoporus nilghiricus* Regimbart, *Ann. Soc. ent. Fr.*, Paris, 72, p. 331.

1920. *Hyphoporus nilghiricus* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, 4, p. 72.

Material.—67 ex. as follows :—Nawa, 15. xi. 1956, 1 ex. ; -. iii. 1948, 45 ex. ; Jogmandi Jharna, 3. iii. 1948, 14 ex. ; Mount Abu, 8. iii. 1948, 6 ex. ; 10. iii. 1948, 1 ex.

Remarks.—This species has not been recorded since it was described by Regimbart (1903) from the Nilgiris. There is a single example, ♀, in the collection of the Zoological Survey of India, from Coonoor, Nilgiris, which was determined by Gschwendtner. The specimens before me agree fairly well with the description as given by Regimbart. The structure of the penis (Text-fig. 3b) is markedly different from the preceding two species.

Subfamily COLYMBETINAE

Key to the tribes and genera known from India

- | | |
|--|--------------------|
| 1. Claws of the metatarsi equal ; metatarsal segments not lobed on the outer side | 2 |
| Claws of the metatarsi unequal ; metatarsal segments lobed on the outer side | 3 (Colymbetini) |
| 2. Inferior face of the metafemora with a fringe of ciliae on the apical posterior angle | 5 (Agabini) |
| Inferior face of the metafemora without a fringe of ciliae on the apical posterior angle | 7 (Copelatini) |
| 3. Sides of the pronotum rebordered | 4 |
| Sides of the pronotum not rebordered | <i>Colymbetes</i> |
| 4. Inferior face of the metafemora with a fringe of ciliae on the posterior apical angle | <i>Ilybius</i> |
| Inferior face of the metafemora without a fringe of ciliae on the posterior apical angle | <i>Rhantus</i> |
| 5. Wings of the metasternum variable in size, but always distinctly wedge shaped, never linear | <i>Agabus</i> |
| Wings of the metasternum quite slender and linear | 6 |
| 6. Epipleurae continuing to be rather broad after the middle of the elytra | <i>Platambus</i> |
| Epipleurae after the middle of the elytra, quite narrow | <i>Platynectes</i> |
| 7. Elytra with dorsal striae | <i>Copelatus</i> |
| Elytra without dorsal striae | <i>Lacconectus</i> |

Genus 8. **Rhantus**16. **Rhantus taprobanicus** Sharp

1890. *Rhantus taprobanicus* Sharp, *Trans. R. ent. Soc. Lond.*, London, p. 346.

1920. *Rhantus taprobancus* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, 4, p. 207.

1935. *Rhantus taprobanicus* : Gschwendtner, *Rec. Indian Mus.*, Delhi, 37, p. 373.

Material.—11 ex., Mt. Abu,—,iii. 1948.

Remarks.—This species has been recorded from Ceylon and India (Kanara, Simla, Sangli, Kodaikanal, Bombay, Pedong, Sikkim, E. and W. Himalaya). Though the exact locality is not mentioned on the label, it is presumed that the specimens were collected around Mount Abu.

Subfamily *DYTISCINAE**Key to the tribes and genera known from India*

1. Hind margins of the four basal metatarsal segments on both the anterior and posterior faces fringed with elongate golden yellow ciliae overlapping the base of the next segment 2
 Hind margins of the four basal metatarsal segments not fringed with any ciliae 6
2. Sides of the pronotum rebordered. Lateral borders of the elytra serrated in the posterior half Eretini (*Eretes*)
 Sides of the pronotum not rebordered. Lateral borders of the elytra not serrated in the posterior half 3
3. Suture between the meta-episternum and metasternal wing straight ; apical spurs of the metatibiae simple, pointed 4 Hydatiini
 Suture between the meta-episternum and the metasternal wing, curved ; apical spurs of the metatibiae blunt, more or less bifid 5 Thermonectini
4. Posterior tarsal claws nearly equal *Prodaticus*
 Posterior tarsal claws unequal *Hydaticus*
5. Smaller, scarcely 10 mm. long ; meso-femora with short thorn like bristles usually reaching one-fourth the length of the trochanters *Rhantaticus*

- Larger, 13-15 mm. long ; meso-remora with few long ciliae not or scarcely shorter than the trochanters *Sandracottus*
6. Metatibiae much longer than broad ; its external spur slender, not much larger than the inner *Dytiscini**
- Metatibiae nearly always broader than long : its external spur broad, at least twice broader than the inner *Cybistrini (Cobister)*

Genus 9. *Eretes*

17. *Eretes sticticus* (Linnaeus)

1767. *Dyticus sticticus* Linnaeus, *Systema Naturae*, ed. 12, 1(2), Holmiae, p. 666.

1920. *Eretes sticticus* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, 4, p. 216.

1947. *Eretes sticticus* : Guignot, *Faune de France*, Coleopteres Hydrocanthares, Paris, 48, pp. 223-224.

Material.—218 ex. as follows :—Gudha, 18. i. 1958, 22 ex. ; 20. i. 1958, 3 ex. ; 4. v. 1958, 3 ex. ; 5. ii. 1958, 2 ex. ; 21. i. 1958, 2 ex. ; 24. i. 1958, 2 ex. ; 10. iii. 1958, 1 ex. ; 7. vi. 1958, 1 ex. ; 30. i. 1958, 1 ex. ; 28. iv. 1958, 1 ex. ; 20. i. 1958, 1 ex. ; Sambhar Lake on road to Dudu, 20. i. 1958, 3 ex. ; Sambhar Lake, 20. xi. 1956, 3 ex. ; 12. xi. 1956, 52 ex. ; Nawa, 15. xi. 1956, 70 ex. ; Pali, 6. xii. 1956, 1 ex. ; Jhapog, 1958, 1 ex. ; Koni, 24. v. 1958, 1 ex. ; Bangadh, 5. vi. 1958, 8 ex. ; Sikar Dist., 8-15. xi. 1960, 40 ex.

Remarks.—This species is extremely variable in size, colour, form and sometimes in the shape of the posterior angles of the pronotum. It occurs throughout the world in tropical and subtropical regions. Baid (1959) stated that it is available in the Sambhar Lake proper upto September and October, at salinities 2.81—4.61 per cent. This species was, however, collected in the reservoirs and the pumping station at Jhapog at much higher salinities (11°-14°, B.E.) during the months of January to May 1958, and November 1956. During these months the approach to the water in the lake is very difficult on account of the nature of the soil surrounding the water making it almost impossible to reach the centre for making collections.

Genus 10. *Hydaticus*

18. *Hydaticus fabricii* Macleay

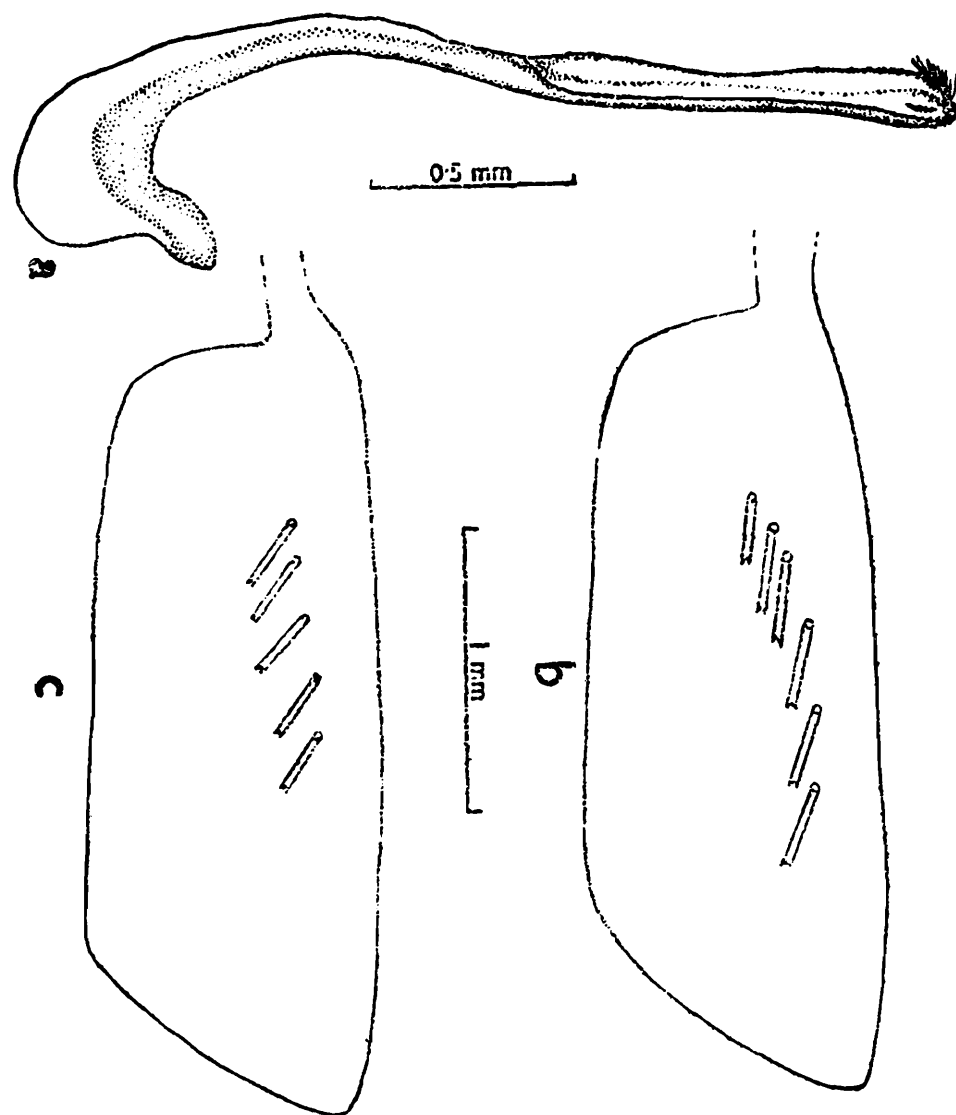
(Text-fig. 4a-c)

1833. *Hydaticus fabricii* Macleay, *Annulosa Javanica*, Paris, p. 131.

1920. *Hydaticus fabricii* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, 4, p. 220.

*Not so far recorded from India.

Material.—4 ex. as follows :—Sambhar Lake, Bahadurpur, 27. iv. 1958, 1 ex. ; Phulad, Jogmandi stream, 3. iii. 1948, 1 ex. ; Mavli, Rajsa-
mand, 27. ii. 1948, 1 ex. ; iii. 1948, 1 ex.



TEXT-FIG. 4.—Diagrams of *Hydaticus fabricii*. (a) Lateral view of penis of a specimen from " Rajasthan ". (b) Posterior face of metatibia, showing the bifid spines ; specimen from " Rajasthan " (same as in Fig. a). (c) Ditto, specimen from Bahadurpur, Sambhar Lake.

Remarks.—This species has often been confused with *leander* Rossi, *ponticus* Sharp and *incertus* Regimbart. Balfour-Browne (1950) has discussed the disposition of the bifid spines on the posterior face of the meta-tibiae but it appears that this character is of doubtful value. The bifid spines on posterior face of meta-tibiae of two of the specimens mentioned above are figured here (Text-figs. 4b, c.). The male genitalia, penis (Text-fig. 4a) of one of the specimens is also figured.

19. *Hydaticus luczonicus* Aube

1838. *Hydaticus luczonicus* Aube in Dejean's *Species Coleopteres*, Paris, 6, p. 179.

1920, *Hydaticus luczonicus* : Zimmermann. *Coleopt. Catal. Junk*, Berlin, 4, p. 222.

Material.—2 ex. as follows :—Phulad, Jogmandi Stream, 3. iii. 1948, 1 ex. ; —x. 1941, 1 ex.

Remarks.—This species has been recorded from India (Parishalt, Ragpore, Konbir-Nowatoli, Sangli), Ceylon ; Tonkin ; and the Philippines.

Genus 11. *Rhantaticus*

20. *Rhantaticus congestus* (Klug)

(Text-fig. 2e)

1832. *Hydaticus congestus* Klug, *Symbolae Physicae, Insectes Madagascar*, Berlin, 3, p. 136.

1920. *Rhantaticus congestus* : Zimmermann, *Coleop. Catal. Junk*, Berlin, 4, p. 232.

Material.—16 ex. as follows :—Bangadh,—vi. 1958, 4 ex. ; On road to Dudu from Sambhar Lake, 11. iv. 1958, 4 ex. ; 6. vi. 1958, 2 ex. ; Bahadurpur, 27. iv. 1958, 1 ex. ; Sambhar Lake, 10. iii. 1958, 1 ex. ; Gudha, 7. vi. 1958, 4 ex.

Remarks.—This species is very widely distributed from Madagascar to Australia. The present specimens conform to the typical form (from tropical Asia) as described by Sharp (1882) in his monograph on the family. The black marks on the head and pronotum and the condensation of black spots on the elytra are variable. The locality records from India are rather vague, viz., 'Inde' and 'Himalaya' by Regimbart (1899). It is now recorded from Rajasthan for the first time.

Genus 12. *Sandracottus*

21. *Sandracottus dejeani* (Aube)

1838. *Hydaticus dejeani* Aube in Dejean's *Species Coleopteres*, Paris, 6, p. 115.

1920. *Sandracottus dejeani* : Zimmermann, *Coleopt. Catal. Junk*, Berlin, 4, p. 234.

Material.—12 ex. as follows :—Sambhar Lake, on road to Dudu, 6. vi. 1958, 1 ex. ; 11. iv. 1958, 1 ex. ; Gudha, 4. v. 1958, 1 ex. ; Phulera, 11. iii. 1958, 8 ex. ; —x. 1941, 1 ex.

Remarks.—This is the commonest species of the genus occurring in India. It has been recorded from Murshidabad, Rajmahal, Sunderbans and Poona.

Genus 13. *Cybister*22. *Cybister tripunctatus asiaticus* Sharp

- 1882 *Cybister asiaticus* Sharp, *Sci. Trans. R. Dublin Soc.*, Dublin, 2, p. 731.
1920. *Cybister tripunctatus* var. *asiaticus* : Zimmermann, *Coleop. Catal. Junk.* Berlin, 4, p. 266.
1945. *Cybister tripunctatus asiaticus* : Balfour-Browne, *Occ. Pap. Bishop Mus.*, Honolulu, 28, No. 7, pp. 121-122.

Material.—28 ex. as follows :—Sambhar Lake, Main line salt Reservoir, 22. iii. 1958, 1 ex. ; 12. xi. 1956, Stn. 5, 2 ex. ; Nathela tank, 28. ii. 1948, 2 ex. ; Mount Abu, 8. iii. 1948, 1 ex. ; Phulad, 1. iii. 1948, 3 ex. ; Jogmandi Stream, 3. iii. 1948, 4 ex. ; Sikar Dist. : Rampura, 9. xi. 1960, 1 ex. ; Singaran, 10. xi. 1960, 1 ex. ; Gangara, 10. xi. 1960, 1 ex. ; Malosi, 12. xi. 1960, 3 ex. ; Rashidpura, 11. xi. 1960, 1 ex. ; Dasaki Dhani, 13. xi. 1960, 2 ex. ; Charaubos, 13. xi. 1960, 2 ex. ; Piparali, 13. xi. 1960, 3 ex. ; Chokla Kabas, 14. xi. 1960, 1 ex.

Remarks.—This is a very widely distributed species. Various subspecies and aberrations have been described with full specific rank. Balfour-browne (*t.c.*) considers that the subspecies *asiaticus* is confined to the Oriental Region and this view has been followed here. One example was taken alive on the brine solution of 11° B. E. in Sambhar Lake.

IV--SUMMARY

The paper deals with 22 species belonging to 13 genera of the family Dytiscidae. Previously only 3 species had been recorded from Rajasthan (from the Sambhar Lake). Thus, 19 species are being reported for the first time. Sixteen species have been collected within a radius of 16 km. from the Sambhar Lake. Keys to the genera recorded from India and to the species dealt with in this paper are provided. The figures of the male genitalia (penis only) of 9 species are given to facilitate identification.

V—REFERENCES

- BAID, C. I. 1959. Some preliminary notes on the insect life in Sambhar Lake.—*J. Bombay nat. Hist. Soc.*, Bombay, 56, pp. 361-363.
- BALFOUR-BROWNE, J. 1936. On *Hydroporus intermixtus* Walker (Dytiscidae). *Ent. mon. Mag.*,—London, 72 (6), pp. 129-130.
- BALFOUR-BROWNE, F. 1950. British Water Beetles, 2, pp. i-xx, 1-394. figs. 90. London (Ray Society).
- GOSCHWENDTNER, L. 1935 (1936.) Interassante und Neue Schwimmkafer des Indischen Museums in Calcutta.—*Rec. Indian Mus.*, Calcutta, 37, pp. 365-374.

- GUIGNOT, F. 1947. Faune de France. Coleopteres Hydrocanthares, Paris, 48, pp. 1-286, figs. 128.
- GUIGNOT, F. 1959. Dytiscides du Pakistan Occidental.--*Bull. mens. Soc. Linn. Lyon*, Lyon, 28, pp. 8-11, fig. 1.
- REGIMBART, M. 1899. Revision des Dytiscidae de la region Indo-Malaise.—*Ann. Soc. ent. Fr.*, Paris, 68, pp. 186-367.
- ROONWAL, M. L. 1969. Fauna of Rajasthan, India. Part 1—General Introduction, with a list of collecting localities and a bibliography of Rajasthan zoology.—*Rec. zool. Surv. India*, Delhi, 61 (3&4); [1963], pp. 291-375, 3 pls.
- SHARP, D. 1882. On aquatic carnivorous Coleoptera or Dytiscidae.—*Sci. Trans. R. Dublin Soc.*, Dublin, 2, pp. 179-1003.
- VAZIRANI, T. G. 1954. On a collection of aquatic beetles from the Mettur Dam, Salem Dist., Madras, with the description of a new species—*Rec. Indian Mus.*, Delhi, 50, pp. 423-427.