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Aquatic insects taken at light in Ceylon, with a discussion and bibliography of references to aquatic insects at light

by

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INTRODUCTION

During the period September 1956—January 1959, I collected aquatic insects coming to lights at night. Although many of the records were from Nugegoda where I reside, I was able to get a number of records from other parts of Ceylon too. The number of species taken was remarkably large and belonged to practically every family of aquatic insects whose members are known to fly. There are no previous records of aquatic insects at light from Ceylon. Although there are many records of aquatic insects at light scattered in journals from many parts of the world no systematic study of the phenomenon has so far been made.

The present paper gives records of aquatic insects taken at light during 1956-1959 in Ceylon. The phenomenon of flight at night is discussed in terms of the available information and, in order to bring together some of the available information, a bibliography of records of aquatic insects at light is given.

AQUATIC INSECTS TAKEN AT LIGHT

Insects belonging to the following families were captured at light :—Noteridae, Hydrophilidae and Dytiscidae (Coleoptera) and Hydrometridae, Veliidae, Gerridae, Corixidae and Belostomatidae (Hemiptera—Heteroptera).

NOTERIDAE

One species *Canthydrus luctuosus* Aúbe was taken on three occasions. (Table 1). This species is very common in paddy fields in the vicinity of their capture at light. I am not aware of any previous records of members of this family at light.

HYDROPHILIDAE

Twelve species were recorded (Table 1), namely *Hydraena fontana* Orch., *Limnebius rutipennis* Reg., *Berosus indicus* Motsch., *B.pulchellus* MacL., *Enochrus esuriens* (Walk.), *Paracymus evanescens* (Sharp), *Helochares anchoralis* Sharp, *H.densus* Sharp, *H.pallens* MacL., *Regimbartia attenuata* (F), *Sternolophus brachyacanthus* Rég., and *Amphiops gibbus* (Ill.).

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Note.—The naming of Hemiptera—Heteroptera is that of Lundblad (1933), Hutchinson (1940) and Brooks (1951).

The commonest species were *Berosus indicus* and *Enochrus esuriens*. *Berosus indicus* is one of the commonest hydrophilid beetles in small freshwater habitats. It is often found in pools and paddy fields. Fernando (1959 *b*) found it to be a common colonizer of small habitats throughout the country. *Enochrus esuriens* is also found in large numbers in muddy pools and ponds.

The references to hydrophilid beetles at light have been summarised by Fernando (1958 *a*) and are included in the bibliography. Additional references are those of d'Orchymont (1923) and Guignot (1954).

The Hydrophilidae are the commonest aquatic insects taken at light. The small size of many of the species is perhaps the reason why they have not been recorded more often. Yamamoto (1951) found 21 species of a total of 51 species of aquatic beetles at light to be hydrophilids, in Japan. In addition to the large number of species recorded and their relative frequency at light, some species come to light in large swarms. Fernando (1958 *a*) took about 1,500 specimens of *Helophorous brevipalpis* Bedel in a single night in an artificial habitat only 4 ft. by 4 ft.

Hydrophilidae are with few exceptions herbivorous and feed largely on living and dead plant tissue. The abundance of the type of food in habitats like paddy fields and ponds enables them sometimes to reach enormous numbers. They form an important and numerous component of the insect fauna of Ceylon freshwater habitats of small size.

DYTISCIDAE

Seven species were recorded (Table 1) namely *Cybister confusus* (Sharp), *Copelatus indicus* Sharp, *Laccophilus flexnosus* Aúbe, *L. chinensis inefficens* Walk., *Hydraticens fabricii* MacL. and *Eretes sticticies* L. and *Bidessus inconstans*.

The commonest species were *Laccophilus chinensis inefficens* and *Bidessus inconstans*. Both these species are small and probably herbivorous. They are commonly found in temporary habitats, small ponds and paddy fields.

One of the large Dytiscidae, *Dytiscus marginalis* (L) is commonly recorded in Europe at light. In Ceylon the largest dytiscid *Cybister confusus* which is similar in size to *Dytiscus marginalis* is commonly recorded at light. The large size of these two beetles makes them conspicuous and facilitates recording. These large species are generally not found in large numbers. They often occur singly.

The records of Dytiscidae at light have been summarised by Fernando (1958 *a*) and are included in the bibliography.

HALIPLIDAE

Only a single specimen of *Haliplus pulchellus* Clark was recorded. This beetle has not so far been recorded from Ceylon although it is widely distributed in Siam, Sumatra, Burma, India (Bengal) and Celebes. The only other records of Haliplidae at light are those of Hickman (1931) and Yamamoto (1951).

Haliplidae are generally few in numbers and species as compared with the Hydrophilidae and Dytiscidae and this alone could account for the few records. Haliplidae are also generally small in size and therefore likely to be missed in collections at light.

GYRINIDAE

Only one specimen of *Dineutes unidentatus* Aúbe was recorded (Table 1). Yamamoto (1951) found 3 species of Gyrinidae at light in Japan.

HYDROMETRIDAE

Four specimens of *Hydrometra greeni* Kirk. were taken (Table 2). I found in the collection at the Ceylon National Museum, Colombo, one specimen taken on 7-11-24 and four on 1-9-27 in Colombo. Although Sprague (1956) mentions that the North American species *Hydrometra martini* Kirk. can fly well yet captures at light have not been recorded as far as I know except by White (1879).

VELIIDAE

A single species *Microvelia longicornis* Bueno was recorded (Table 2). On account of its very small size this species can easily be missed in collections at light. *Microvelia longicornis* is a common colonizer of small freshwater habitats all over the low country. It is sometimes found in ephemeral puddles of water. The only record I am aware of is that of White (1879) who took this genus at light on a steamer on the Amazon.

GERRIDAE

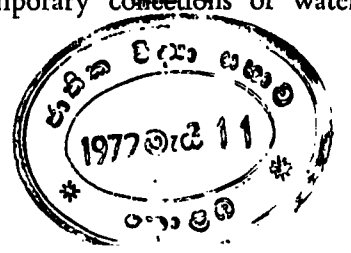
Two specimens of *Limnogonus nitidus* (Mayr) were taken (Table 2). In the Ceylon National Museum collections, Colombo, four specimens have been taken at light on 16-12-23, 23-9-24, 16-10-26 and 22-11-26.

Limnogonus nitidus is a very common colonizer of small freshwater habitats all over the low-country. It is often seen in ornamental ponds and roadside pools of water. Fernando (1959 *b*) records it as a common colonizer of small habitats (*Limnogonus nitidus* = *Gerris nitida* of Fernando 1959 *b*).

BELOSTOMATIDAE

Although only two specimens of *Lethocerus indicus* (Lep. et Serv.) were recorded both from Jaffna peninsula (Table 2), yet this species is a common flier to artificial lights in Ceylon and because of its large size (about 21 ins. long) is a very conspicuous insect. Species of Belostomatidae are common at light and in North America they are called "electric light bugs". In textbooks and many papers mention is made of their attraction to artificial lights. Hungerford (1919) includes many references in his bibliography. Leidy (1847), Hoffman (1924), Step (1925), Cummings (1933), Ramakrishna Aiyer and Anantanarayan (1934), Hidalgo (1935), Stehr (1931) and Corbet (1959) mention Belostomatidae at light.

In Ceylon there are two species of belostomatids, *Lethocerus indicus* and *Spherodema rusticum* (F.). The latter though extremely common in paddy fields, ponds and small streams is not found flying to lights. It seems likely that this species which is a very good swimmer, reaches small habitats by swimming along temporary collections of water formed as a result of rain (Fernando, in press).



CORIXIDAE

I have recorded two species of *Micronecta* at light (Table 2), *Micronecta quadristrigata** Breddin and *M. albifrons* Motsch. The former species was found at light in very large numbers on two occasions. Corixidae are the commonest aquatic Hemiptera at light. These records have been summarised in a previous paper (Fernando 1959 *a*). To this must be added the records of Distant (1906) and Hutchinson (1940). Hutchinson (1940) states that all the specimens of *Micronecta siva* (*Kirk.*) he examined which had any notes were taken at light. It is interesting that *Micronecta siva* and *M. albifrons* are very closely related species, the former being a common species in India.

NOTONECTIDAE

Three species of *Anisops* and one species of *Enithares* have been recorded (Table 2). Of the three species of *Anisops*, *A. batillifrons* (Lundb.) and *A. crinita* Brooks are new records for Ceylon. *Anisops batillifrons* which is a very common species has probably been identified earlier as *Anisops nasuta* Fieb. The other species *A. nivea* (Fieb.) has been previously reported from Ceylon.

Hale (1924) observed a large number of either *Anisops hyperion* Kirk. or *A. doris* Kirk. flying from a lake in Australia early in the morning. The specimens of *Anisops batillifrons* and *A. nivea* I have recorded were taken early morning.

Anisops batillifrons is one of the common Notonectidae colonizing small habitats in the low-country, (Fernando 1959 *b*).

Enithares indica (F.) was recorded on one occasion. This species although not as common as species of *Anisops* is nevertheless found in ponds in many parts of Ceylon.

GENERAL REMARKS

In the aquatic Coleoptera all the families are represented in captures at light. The number of species recorded is 22 and this is a very high proportion of the total number of species of aquatic beetle. In the Hemiptera-Heteroptera six families are represented namely, Hydrometridae, Gerridae, Belostomatidae, Corixidae and Notonectidae. Six others, Nepidae, Ranatridae, Naucoridae, Helotrephidae, Mesovelidae and Hebridae are not represented.

The Nepidae, Ranatridae and Naucoridae often have reduced wings and wing muscles and it is likely that this condition is found in the Ceylonese species too. The Helotrephidae and Mesovelidae are represented in Ceylon by one species each and the Hebridae by two species.

The only mention of members of these six families flying are those of Swammerdam (1749) who mentioned *Nepa* as flying at night, Kirichenko (1911) of *Ranatra linearis* L. flying in Odessa, Russia, and White (1879) who recorded *Mesovelia* at light on a steamer on the Amazon.

*Wrongly called *Micronecta quadrisignata* (Fernando 1958, 1959*b* and 1960) due to an error of spelling.

It is possible that members of these species not taken at light fly during the day. This is however unlikely because these species are not found in small habitats and are therefore probably restricted to the larger habitats which they can reach by swimming.

The occurrence of aquatic insects at light is a phenomenon recorded from Europe, North and South America, Africa, South East Asia and the Far East. The records alone do not give us an adequate idea of the extensive and frequent occurrence. Aquatic insects are generally not collected by agricultural stations or similar institutes that keep a light trap and even when collected they are often left unidentified, because of their innocuous nature as pests. The amateur does not find them sufficiently attractive to collect. I have been reliably informed that in the Pacific Islands and Korea they are common at light but I am not aware of any records from this area. There are perhaps a few records scattered in agricultural and popular journals which I have missed in compiling the bibliography.

The Corixidae (Hemiptera—Heteroptera) and the Hydrophilidae (Coleoptera) are by far the commonest groups recorded at light. Both these families are represented mainly by small herbivorous species. They are also the commonest and the most abundant of the aquatic insects found in small freshwater habitats. Their food which is abundant and their ability to fly both by day and night makes them the most widely distributed and abundant of aquatic insects.

The Belostomatidae because of their large size are generally recorded at light out of proportion to their frequency as compared with the other aquatic insects.

SEASONALITY OF CAPTURES AT LIGHT

There is a marked seasonality in the flight of aquatic insects at night as shown by captures at artificial lights. In Ceylon there are generally four periods in the year when such flights are recorded. In April, May and June, two periods coinciding with the early monsoonal rains and the established monsoonal rains and again in October—January two similar periods with the early and established monsoonal rains. This periodicity corresponds to the normal colonization cycle in these species, (Fernando 1958 *b*).

In temperate countries like Britain there is only one period in the year when flight occurs as recorded by captures at light. This is during the height of summer (Fernando 1958 *a*, 1959 *a*). Yamamoto (1951) recorded large numbers of aquatic beetles in summer using a light trap in Japan. There is evidence that many species of aquatic insects fly during early spring (Fernando 1958 *a*, 1959 *a*). It is likely that in temperate countries the over-wintering generation does not fly at night in spring because of the prevailing low night temperatures.

Flight at night is therefore not a casual occurrence but a regular and integral part of the normal colonisation cycle of these insects. Regular trapping at night is therefore a useful method in recording the movements of certain aquatic insects for purposes of studying their colonization cycle.

FACTORS CAUSING FLIGHT IN AQUATIC INSECTS

In a previous paper (Fernando, 1959*a*), I considered flight as a step in the process of colonization of habitats by aquatic insects and discussed the various factors causing colonization. Flight is caused by two types of factors, (*a*) Proximate e.g. the internal state of the insect and light intensity, and (*b*) Ultimate e.g. food and habitats.

The proximate factors causing flight at night have so far not been systematically studied although there is some evidence from laboratory studies that light intensity plays a part, Stehr (1931) and Popham (1942, 1953). Sajo (1897) states that insects fall into a "Nervous State" during a barometric depression and mentions *Corixa* as one of these insects. In Ceylon flight to artificial lights coincides with rain (Tables 1 and 2). Nath (1933) observed that the numbers of insects taken at light increase during rainy weather.

The ultimate factors that cause flight are food and habitats. In a tropical monsoonal country like Ceylon habitats are available, at such times of the year when rain occurs, in greatly increased numbers.

Since captures at light indicate that flight at night is a widespread phenomenon it is worthwhile to discuss the survival value of this type of behaviour as compared with flight during the day. In hot weather the likelihood of desiccation is very great for small insects flying in sunshine. Flight at night enables an insect to travel much farther. There are fewer predators in the air at night than during the day. This may be of importance because many birds feed on aquatic insects in flight, (Fernando 1958 *a*, 1959 *a*).

SUMMARY

Aquatic insects captured at light in Ceylon during 1956—1959 are recorded. They belong to the following families: Noteridae (1 Sp.), Hydrophilidae (12 Spp.), Dytiscidae (7 Spp.) and Gyrinidae (1 Sp.), (Coleoptera); and Hydrometridae (1 Sp.), Veliidae (1 Sp.), Gerridae (1 Sp.), Belostomatidae (1 Sp.), Corixidae (2 Spp.) and Notonectidae (4 Spp.), (Hemiptera—Heteroptera).

The commonest species recorded were *Micronecta quadristrigata* (Corixidae); *Berosus indicus* and *Enochrus esuriens* (Hydrophilidae); and *Laccophilus chinensis inefficens* (Dytiscidae).

The flight of aquatic insects at night is a widespread phenomenon all over the world and it is an integral part of the colonization cycle in certain species.

The seasonality of captures and the proximate and ultimate factors causing flight at night are discussed.

A bibliography of records of aquatic insects at artificial light is given.

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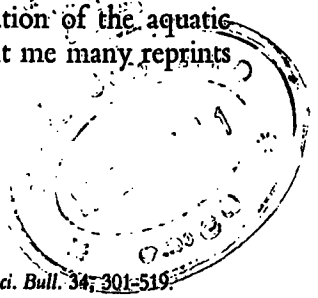

REFERENCES

and bibliography of references to aquatic insects at light.

BROOKS, G. T. 1951—A revision of the genus *Anisops* (Notonectidae, Hemiptera). *Kans. Univ. Sci. Bull.* **34**, 301-519.

BROWN, E. S. 1954—Report on Corixidae (Hemiptera) taken in light-traps at Rothamsted Experimental Station. *Proc. R. ent. Soc. Lond.* (A), **29**, 17-22.

BROWNE, F. BALFOUR, 1953—The aquatic Coleoptera of the Western Scottish Islands, with a discussion on their sources of origin and means of arrival. *Ent. Gaz.* **4**, 79-127.

BURR, M. 1930—Field notes from Northern Rhodesia. *Ent. Rec.* **42**, 85-89.

COLLETT, H. R. P. 1930—Coleoptera at light. *Ent. mon. Mag.* **66**, 257.

CORBET, P. S. 1959—Notes on the insect food of the Nile Crocodile in Uganda. *Proc. R. ent. Soc. Lond.* (A), **34**, 17-22.

CUMMINGS, C. 1933—The giant water bugs (Belostomatidae-Hemiptera). *Kans. Univ. Sci. Bull.* **34**, 197-219.

DISTANT, W. L. 1906—The fauna of British India. *Rhynchota III, London.*

D'ORCHYMONT, A. 1923—Hydrophilidae of India (Col.). A list of species in the collection of the Agriculture Institute in Pusa (Bihar). *Mem. Dept. Agric. India* 1-12.

FERNANDO, C. H. 1958*a*—The colonization of small freshwater habitats by aquatic insects. 1. General discussion, methods and colonization in the aquatic Coleoptera. *Ceylon J. Sci. (Bio. Sci.)* **1**, 117-154.

1958*b*—The colonization of freshwater habitats with special reference to aquatic insects. *Proc. Cent. Bicent. Congr. Singapore.* p. 32.

1959*a*—The colonization of small freshwater habitats by aquatic insects. 2. Hemiptera (The water-bugs). *Ceylon J. Sci. (Bio. Sci.)* **2**, 5-32.

1959*b*—Some observations on aquatic insects found in temporary and artificial habitats in Ceylon. *Ceylon J. Sci. (Bio. Sci.)*, **2**, 1-4.

—The colonization of freshwater habitats with special reference to aquatic insects. *Bull. Raffles Mus.* (in Press).

GUIGNOT, F. 1954—Hydrocanthares captures a'la lumiere dans le Haut—Katanga. *Rev. Zool. Bot. Afric. Brussels*, **47**, 233-237.

HALE, H. M. 1924—Notes on eggs, habits and migration of some Australian aquatic bugs (Corixidae and Notonectidae). *S. Aust. Nat.* **5**, 133-135.

HICKMAN, J. R. 1931—Contribution to the biology of the Haliplidae (Coleoptera). *Ann. ent. Soc. Amer.* **24**, 129-142.

HIDALGO, JOSE 1935—The genus *Abedus* (Belostomatidae, Hemiptera). *Kans. Univ. Sci. Bull.* **22**, 493-519.

HOFFMAN, A. 1924—Biological notes on *Lethocerus americanus. Psyche* **33**, 175-183.

HUGGINS, H. C. 1954—The dispersal of insects. *Ent. Gaz.* **5**, 63-64.

HUNGERFORD, H. B. 1919—The biology and ecology of the aquatic and semi-aquatic Hemiptera. *Kans. Univ. Sci. Bull.* **11**, 1-341.

1925—Notes on the giant water bugs. *Psyche* **32**, 88-90.

1940—Results of the Oxford University Cayman Islands biological expedition of 1938 (aquatic Hemiptera). *Ent. mon. Mag.* **76**, 225-256.

HUTCHINSON, G. E. 1933—The Zoo-Geography of the African aquatic Hemiptera in relation to past climatic change. *Int. Rev. Hydrobiol.* **28**, 436-468.

1940—A revision of the Corixidae of India and adjacent regions. *Trans. Conn. Acad. Arts. Sci.* **33**, 339-476.

JACKSON, D. J. 1953—Observations on the capacity of flight of water beetles. *Proc. R. ent. Soc. Lond.* (A), **27**, 57-70.

KINDRED, A. 1953—Water bugs coming to light. *Bull. amat. Ent. Soc.* **12**, 11-12.

KIRKALDY, G. W. 1900—Notes on Jamaican Rhynchota No. 2. *Entomologist* **33**, 70-73.

KIRICENKO, A. N. 1911—Notices sur les Hemipteres Heteropteres de la faure Russe. *Rev. Russe Ent.* **11**, 40-43.

KNOWLTON, G. F. 1951—A flight of water boatmen. *Bull. Brooklyn ent. Soc.* **46**, 22-23.

LEIDY, J. 1847—History and Anatomy of the Hemiptern genus *Belostoma. Journ. Acad. Sci. Philadephia.* 53-67.

LUNDBLAD, O. 1933—Zur Kenntnis der aquatilen und semiaquatilen Hemipteren von Sumatra, *Java und Bali Arch. für, Hydrobiol.* Suppl. 12.

LESTON, D. 1953*a*—Corixidae (Hem.) at Ultra-violet light in Kent. *Ent. mon. Mag.* **89,** 279.

1953*b*—Corixidae (Hem.) at Ultra-Violet light in Middlesex, with remarks on migrations. *Ent. mon. Mag.* **89,** 291

1954—Corixidae (Hem.) at Ultra-Violet light; additional data. *Ent. mon. Mag.* **90,** 166.

LESTON, D. AND GARDNER, A. E. 1953—Corixidae (Hemiptera) at Mercury-vapour light; some records from Surrey, England. *Ent. Gaz.* **4,** 269-272.

LÖW, F. 1866—Zoologische notizen. *Verh. Zool.—bot. Ges. Wien.* **16,** 943-956.

MCATEE, W. H. 1922—A shower of Corixidae (Heter.) *Ent. News* **33,** 88.

MICHAELIS, H. N. 1955—Microlepidoptera at a M. V. Lamp in a Manchester garden. *Ent. Rec.* **67,** 286-288.

NATH, DINA 1933—Preliminary observations on the attraction to light of moths of the sugar cane borers. *Rep. Proc. Vth Ent. Meeting Pusa.* 65-74.

OSBORNE, P. J. 1956—Insects other than Lepidoptera at a Mercury-vapour light-trap. *Ent. mon. Mag.* **92,** 19.

POPHAM, E. J. 1942—The influence of light in the migration of Corixidae. *Entomologist* **75,** 77-80.

1953—The influence of temperature and intensity of light upon the phototactic responses of Corixidae (Hem.). *Ent. mon. Mag.* **89,** 1-2.

PUTON, A. 1882—Pluie de *Corisa. Rev. Ent. Caen.* **1,** 22-23.

RAMAKRISHNA AIYAR, T. V. AND ANANTANARAYAN, K. P. 1934—Insects at light. *Madr. Agric. Journ.* **22,** 268-273.

RAU, P. 1943—The neon-sign dance of the water-boatman *Trichocorixa verticalis* (Fieb.) (Hemiptera). *Ent. News* **54,** 258-259.

ROGENHOFER, A. 1871—*Corisa hieroglyphica* Duf. *Verh. Zool.—bot. Ges. Wien.* **21,** 65.

SAJO, K. 1897—Insektenreisen. *Illust. Wschr. Ent.* **2,** 229-235; 241-242.

SCOTT, H. 1953—A large flight of water-beetles and their attraction to light. *Ent. mon. Mag.* **89,** 260-261.

SHERMAN, J. D. 1933—Some habits of the Dytiscidae. *J. N.Y. ent. Soc.* **21,** 43-54.

SPRAGUE, I. B. 1956—The biology and morphology of *Hydrometra martini* Kirkaldy. *Kans. Univ. Sci. Bull.* **38,** 579-693.

STEHR, W. C. 1931—The activating influence of light on certain aquatic anthropods. *J. Exp. Zool.* **59,** 297-335.

STEP, E. 1925—Report of the South London Entomological Society. *Entomologist* **58,** 304.

SWAMMERDAM, J. 1737—The book of nature or the history of insects. *Hill's English Translation.*

THOMAS, D. C. 1938—Report on the Hemiptera-Heteroptera taken in a light trap at Rothamsted Experimental Station during the four years 1953—1936. *Proc. R. ent. Soc. Lond.* (A), **13,** 19-24.

TUTT, J. W. 1901—Abundance of *Hydrophilus piceus* at electric light. *Ent. Rec.* **13,** 273.

WARD, H. B. AND WHIPPLE, G. C. 1945—Freshwater biology. *John Wiley, New York.*

WHITE, F. B. 1879—List of Hemiptera collected in the Amazons by Professor J. W. H. Trail, M.A., M.D. in the years 1873-1875, with descriptions of a new species. *Trans. R. ent. Soc. Lond.* (1879) 267-276.

WILLIAMS, F. X. 1944—Biological studies on Hawaiian water-loving insects—Part V, Hemiptera or bugs. *Proc. Hawaii ent. Soc.* **12,** 186-196.

YAMAMOTO, Y. 1951—On the phototropic response of aquatic beetles to the fluorescent light-trap (1) Oyo Kontyu, **7,** 20-24. (*In Japanese with English Summary*).

ADDENDUM

DE CARLO, J. A. 1938—Los Belostomidos Americanos. *Ann. Mus. Argent. ci. nat.* **39,** 186-260.

D'ORCHYMONT, A. 1927—Papers on Malayan aquatic biology V. Notes on the Hydrophilidae in the Federated Malay States Museum. *J. F. M. S. Mus.* **13,** 246-259.

CUMBER, R. A. 1953—Flight records of Coleoptera and Hemiptera taken with a modified Rothamsted Light trap operated in Paiaka. *N. Z. Journ. Sci. Tech.* **34,** 242-244.

DOVER, C. 1929—Papers on Malayan aquatic biology IX. A new *Corixa* (*Corixa evansi* sp. nov.) from Siam. *J. F. M. S. Mus.* **14,** 399-400.

KITCHENER, H. J. 1955—The giant water scorpion. *Malay. Nat. J.* **10,** 63-66.

PAIVA, C. A. 1918—Rhynchota from Barkuda Island. *Rec. Indian Mus.* **15,** 1-16.

LOCALITY	Nugegoda	Nugegoda	Nugegoda	Nugegoda	Nugegoda	Maha-illupalama	Horowapotana	Lunawa	Anuradhapura	Nugegoda	Nugegoda	Nugegoda	Nugegoda	Nugegoda	Kiniyama	Nedalagamuwa	Colombo (Pettah).	Wattala	Jaffna (Manipay)	Nugegoda
DATE / SPECIES	12.10.56	8. 1.57	16. 6.57	11.11.57	24.11.57	30.11.57	1.12.57	11.12.57	8.12.57	12.12.57	6.4.58	29. 4.58	1. 5.58	2. 5.58	3. 5.58	4. 5.58	30.7.58	15. 9.58	2.11.58	10.11.58
Rain = R	*R*	*R*		*R*	*R*	*R*	*R*	*R*	*R*	*R*		*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*
Noteridae																				
Canthydrus luctuosus		1														3				1
Hydrophilidae																				
Hydraena fontana				2																
Limnebius rutipennis					2															
Berosus indicus					1		1					1	8	28	1	8				
Berosus pulchellus					3									2	2					2
Enochrus esuriens	5			11	3	9				14		3	26	131						
Paracymus evanescens	3												11							
Helochares anchoralis														38						
Helochares pallens.	6			6	3	3						1	5							
Helochares densus						4								7						
Regimbartia attenuata														11						2
Sternolophus brachyacanthus					3	1						3		8		3				
Amphiops gibbus						2														
Dytiscidae																				
Cybister confusus											1						1	1	1	
Copelatus indicus						7	1						4	9					1	
Laccophilus flexuosus						3								1						
Laccophilus chinensis inefficens	1		1	11		1	12	2		11		1	12	125					1	3
Hydraticus fabricii												1		1						
Bidessus inconstans	5			5	1															
Eretes sticticus							4		2			2								
Haliplidae																				
Haliplus pulchellus						1														
Gyrinidae																				
Dineutes unidentatus																			1	

TABLE I. AQUATIC COLEOPTERA. TAKEN AT LIGHT 1956—1958.

LOCALITY	Nugegoda	Nugegoda	Polonnaruwa	Nugegoda	Nugegoda	Nugegoda	Nugegoda	Nugegoda	Maha-illupalama	Jaffna (Town)	Lunawa	Nugegoda	Nugegoda	Nugegoda	Kiniyama	Nedalaganuwa	Nugegoda	Nugegoda	Nugegoda	Nugegoda	Jaffna (Manipay)	Coombo (Colpetty)	Nugegoda	Nugegoda	Nugegoda
DATE / SPECIES	8. 1.57	11. 2.57	13. 4.57	16. 6.57	11.11.57	24.11.57	25.11.57	27.11.57	30.11.57	2.12.57	11.12.57	29. 4.58	1. 5.58	2. 5.58	3. 5.58	4. 5.58	19. 5.58	20. 5.58	15.10.58	2.11.58	11.11.58	27.12.58	8. 1.59	10. 1.59
Rain = R	*R*		*R*		*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*	*R*		*R*	*R*	*R*	*R*	*R*	*R*	*R*
Hydrometridae																								
Hydrometra greeni		1											1		1								1	
Veliidae																								
Microvelia longicornis					8							1	1	1										
Gerridae																								
Limnogonus nitidus									1												11			
Belostomatidae																								
Lethocerus indicus										1										1				
Corixidae																								
Micronecta quadristrigata	8		16	1	8	14	9	5	5		250	7	9	31		1000			10			2		3
Micronecta albifrons									1								1							
Notonectidae																								
Anisops batillifrons														3										
Anisops crinita																		1						
Anisops nivea														1	1									
Enithares indica																								1

TABLE 2. HEMIPTERA—HETEROPTERA (WATER-BUGS). TAKEN AT LIGHT 1957—1959.