

Observations on the Dragonfly Fauna of the coastal region of Zululand, with descriptions of three new species (Odonata)

by

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INTRODUCTION

During two summer visits to the coastal region of Zululand, Natal, in December-January of 1957-1958, and in December-January of 1959-1960 I have had an opportunity to collect dragonflies in the area, which does not seem to have been studied systematically in this respect previously. The results of my collecting would seem to be sufficiently interesting to justify the present publication.

The coastal region of Zululand presents several different types of bodies of water each harbouring its own community of dragonflies. The main types are the following:

1) LAGOONS. Of these I have surveyed two: Richard's Bay (which was my main station in the area) and St. Lucia Bay (the points actually visited were Charter's Creek and Fannies' Island Rest Camp). The water in these lagoons is salty to brackish and presumably no dragonflies can breed in the lagoons, but many are found flying in the proximity of their shores or in streams and swamps opening into the lagoons.

2) FRESH WATER LAKE — the Umsingazi lake, situated in the close proximity of Richard's Bay, and connected with the Bay by means of a small stream. The lake and the swamps associated with it proved to be extremely rich in dragonflies, both in numbers of individuals and numbers of species.

3) SMALL FRESH WATER PONDS OR PANS of a permanent or semi-permanent nature found both in the Richard's Bay and in the St. Lucia Bay areas.

4) RIVERS. Three larger rivers cross the area in which I did my collecting: The Umfolozi river, entering the sea at the mouth of St. Lucia Bay, the Nyalazi (or Unialazi) river, flowing into St. Lucia Bay, and the Enseleni river, flowing into Richard's Bay.

Whilst the Umfolozi river and the Nyalazi river do not differ appreciably in the vegetation surrounding them and in their dragonfly fauna from stretches of river further inland, I found that the Enseleni river was overgrown on its southern bank with a very peculiar forest vegetation. The dominant tree in the forest is *Barringtonia racemosa*. Patches of similar forest vegetation are to be found along the shore of Richard's Bay, on the swamp at the foot of the hill on which Richard's Bay Hotel is situated, and on the swamps surrounding the Umsingazi lake. The *Barringtonia* trees grow mainly in damp places, or even in the water. Wherever the *Barringtonia* was in any abundance I found a dragonfly population of a very peculiar character, as will be indicated in the following pages.

In completing the present investigation I have received assistance from various persons and institutions, to which I should like to acknowledge my indebtedness at this stage. Firstly I should like to thank the National Parks Board for permission to collect dragonflies in the area, much of which is protected as National Parks. Colonel F. C. Fraser has kindly examined some of the specimens collected, and has helped me to decide on their systematic standing. In particular he has compared for me representatives of two species of *Acanthagyna* (*Gynacantha*) with other African *Acanthagyna* species. My son, Dr J. B. Balinsky, during his stay in London, compared the structure of the abdominal sternites of a species which is described below as *Acanthagyna zuluensis* spec. nov. with corresponding structures in other species of the genus represented in the British Museum. To Mr D. E. Kimmins of the British Museum (Natural History) I am indebted for the permission to have this comparison carried out. I should like to express my most sincere gratitude to Mr M. P. Basilewski of the Musée de Congo Belge in Tervuren, for supplying me with specimens of *Acanthagyna ballata* Karsch for comparison with *Acanthagyna* species from Zululand. Lastly I should like to record my thanks to Mr Jeudwine, superintendent of the Charter's Creek Rest Camp, who has assisted me in exploring the St. Lucia Bay area.

LIST OF SPECIES FOUND IN THE AREA

Family LESTIDAE

Lestes tridens McL.

In small semi-temporary pools with abundant grass along the shore. Richard's Bay, Nyalazi river area, 1957.

Family COENAGRIIDAE

Ceriatagrion glabrum (Burm.)

1957 and 1959. Abundant at Umsingazi lake, St. Lucia Bay, small pools, Enseleni river.

1961

Pseudagrion angolense Selys

Umsingazi swamp and stream, 1957/58.

Pseudagrion nigerrimum Pinh.

Two females, Nyalazi river, 27.XII.1957. This species originally described from Southern Rhodesia, and Portuguese East Africa by Pinhey (1950), has later been found by myself in N. W. Transvaal (Balinsky, 1958). The present record extends the area of distribution of the species further to the South East.

Pseudagrion massaicum Sjöstedt

Widespread throughout the area, found on Enseleni and Umsfolozi rivers and on the Umsingazi lake, 1957 and 1959.

Pseudagrion species near **nubicum** Selys

This form occurs in great abundance on the Umsingazi Lake, and occasionally on the Enseleni river. The insects show a close resemblance to *P. nubicum* Selys, at least to the specimens in the Transvaal Museum classified as *P. nubicum* by Mr E. C. G. Pinhey. They differ, however, in their appreciably larger size, in a slightly lesser degree of development of the black pattern, and in details of structure of the anal appendages in the male. Possibly this is a local race of *P. nubicum*, but I am leaving the final judgment on the systematic position of the form until further investigation has been carried out, 30-31.XII.1957, 26.XII.1959.

Enallagma nigradorsum Selys

Was found in 1957 in abundance on small semipermanent pools at Richard's Bay and in the Nyalazi river area. In 1959 found again at the Black Bass pond, Richard's Bay, a more permanent body of water.

Agriocnemis exilis Selys

Abundant in 1957 on semipermanent pools together with *Lestes tridens* at Richard's Bay and in the Nyalazi river area. Not found in 1959.

Agriocnemis graciosa Gerst.

One female captured in the Umsingazi swamp, 1.1.1958.

Agriocnemis ruberrima spec. nov., figs. 1-7.

MALE. (Mature, non-pruinose). Labrum and postclypeus intensely black with blue metallic sheen. A narrow anterior edge of the labrum, anterclypeus, genae and anterior surface of the frons and areas adjoining the eyes grass green. Dorsal surface of the head black. Eyes black above and green below, occiput mainly green but black in the hollow; postocular spots completely isolated, oblong, slightly kidney-shaped, bluish green (more blue in a general specimen); underside of head yellowish white. Prothorax black with broad green transverse band anteriorly, and green areas on the sides. Posterior edge of prothorax (fig. 1) with three distinct lobes: the two lateral lobes very narrow, marked with green; medial lobe very large, broadening distally, almost

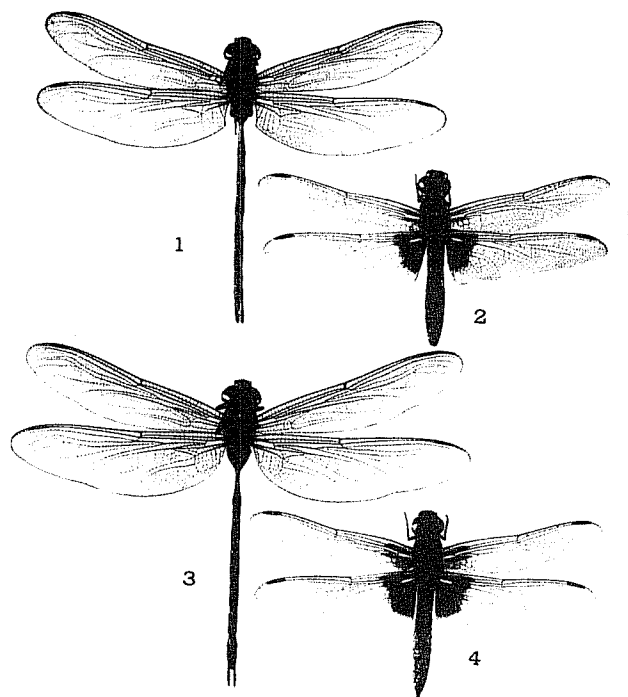


Plate 1. 1. *Acanthagyna zuluensis* spec. nov. ♂. 2. *Urothemis luciana* spec. nov. ♀.
3. *A. zuluensis* ♀. 4. *U. luciana* ♂. All photographs 4/5 of natural size.

erect in its distal part, with the posterior edge (including the protruding posterior angles) broadly rimmed with green. Synthorax black dorsally and green laterally, with narrow green antehumeral stripes (fig. 3); the black reaches to 1st lateral suture, which it surpasses slightly at the posterior end; a black spot at the posterior end of the second lateral suture; under side of thorax yellow. Legs mainly yellow, but with brown stripes along the dorsal sides of the femora and dark spots at the knees on the lateral surfaces of the femora; tibiae and tarsi brown. Pterostigmae rather elongated with distal margin much longer than the proximal margin, all the same colour, light buff brown between dark veins.

Abdomen (fig. 3): First abdominal segment green on the sides and posterior edge, black dorsally; second abdominal segment yellowish green on the sides and black dorsally, with black posterior edge; the latter is almost but not quite separated from the black dorsal area by intrusions of green which, however, do not meet mid-dorsally. Segments 3-10 predominantly bright red dorsally fading to yellow on the ventral side; the 3rd abdominal segment with incomplete yellow ring at anterior edge and with a black spot at anterior end dorsally which narrows posteriorly into a thin median streak; the latter does not reach half the length of the segment; segments 3-6 with black posterior edges, segments 7-10 clear red. The tergite of the 10th abdominal segment raised at posterior edge. The anal appendages red; the superior anal appendages (figs. 5, 6 and 7) with a very short narrow proximal part and an irregularly inflated distal part; on their dorsal sides the appendages are drawn out into horn-like processes which are curved outwards and downwards and have strongly sclerotized black tips; on their inner side the appendages bear long flattened spines which are directed downwards and inwards; the flattening of the spines is in a transverse plane, so that the spines appear broad in posterior view (fig. 7) but very narrow in lateral view (fig. 5). The length of the upper anal appendages is slightly more than $\frac{2}{3}$ of the length of the 10th abdominal segment; the inferior anal appendages are slightly shorter than the superior anal appendages, with a broad base, which is curved when viewed from behind, and a conical distal prolongation ending with a chisel-shaped (flattened) strongly sclerotized black tip (fig. 5).

FEMALE (the available specimen is somewhat teneral). Labrum light brown marked with darker brown dorso-medially and at lateral edges. Clypeus and frons light brown, genae yellow. Dorsal side of the head mainly black but reddish brown posteriorly; the blue postocular spots lie in this reddish-brown area; eyes black dorsally and green ventrally; occiput light brown. Prothorax reddish brown, whitish ventro-laterally; posterior edge of prothorax (fig. 2) is raised almost vertically, the lateral parts of the edge are fairly narrow, but the median lobe is very strongly developed, trapezoid, almost rectangular with slightly rounded angles. The mesostigmal laminae bear at their posterior edges very well developed vertical ridges, which are curved forwards at their outer ends. Synthorax (fig. 4) reddish brown dorsally and dorso-laterally, and yellow ventro-laterally, with a broad dark brown band

along the medial suture covering slightly less than half of the mesepisterna. To the outside of this dark band the insects show in life bluish violet antehumeral stripes. Legs mainly yellow with darkish rings on femora subterminally and dark spots at the knees on the distal ends of the femora (as in the males), tibiae and tarsi darker.

Abdomen mainly bright red, segments 2—5 with black posterior edges, segment 6 mainly red but black at posterior end, segments 7—10 blackish dorsally, but yellowish green ventro-laterally, cerci brown.

♂-Holotype and ♀-allotype: Richard's Bay (Natal), 26.XI.1957, both in collection Transvaal Museum; paratypes: 3 ♂♂ in author's collection (all type material collected by B. I. Balinsky).

Measurements:	♂	♀
Abdomen	15.5—16.5 mm	17 mm
Hind wings	8.5—9 mm	10.5 mm
Postnodal crossveins	6½—6	7½—7½
	7—7	

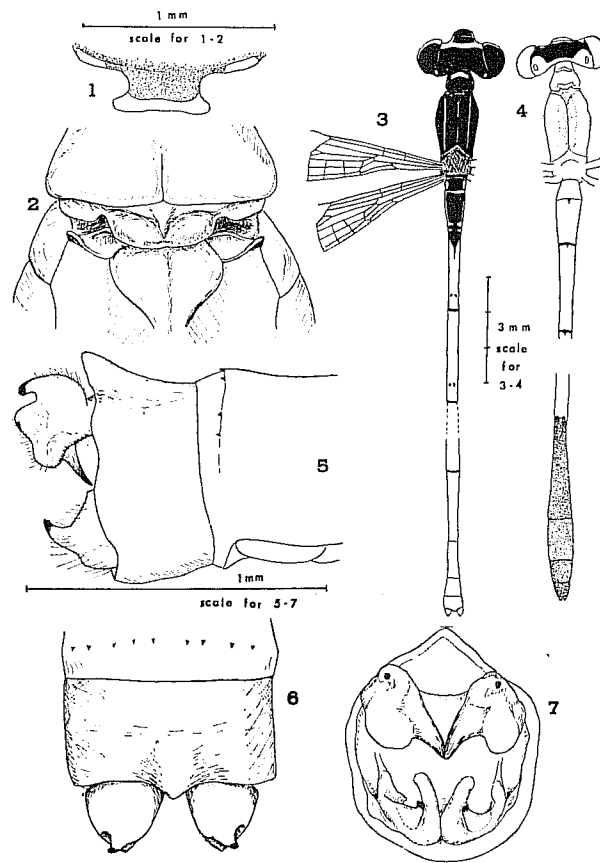
REMARKS: This species is conspicuous by the extreme reduction of the black markings on the dorsal side of the abdominal segments in the male. The mainly pale colour of the occiput, and the relative length of the dorsal and ventral anal appendages place the species in a group to which belong *A. exilis* Sélys, *A. ebneri* Ris, *A. gratiosa* Gerst., 1891 (= *A. consimilis* Grünberg, 1902), *A. fulcifera* Pinhey; see also Schmidt (1917-19) and Nielsen (1956-58).

However, the present species presents clear differences in the shape of the anal appendages, especially of the superior anal appendages, from all these species. A medial spine on the superior anal appendages apart from *A. ruberrima* is present only in *A. exilis* (Le Roi, 1915), but the shape of the spine is different (it is much flatter in *A. exilis*), and besides *A. exilis* lacks the "horn" on the dorsal end of the appendage which is present in our species. The shape of the posterior lobe of the prothorax in the male of the new species is also quite distinctive.

The specimens of the new species were collected in 1957 on the grass around the edges of a shallow pool about a ¼ of a mile from Richard's Bay Hotel. In 1959 the pool was almost dry and no *Agriocnemis* could be found.

EXPLANATIONS OF FIGURES

Figs. 1—7. *Agriocnemis ruberrima* spec. nov. 1. Posterior edge of prothorax in ♂. 2. Prothorax and part of synthorax in ♀. 3. Colour pattern in ♂. 4. Colour pattern in ♀. 5. Anal appendages of ♂ from the right side. 6. Same, dorsal view. 7. Same posterior view.



Family AGRIIDAE

Phaon iridipennis (Burm.)

Found amongst bushes at the Nyalazi river, 27.XII.1957.

Family CHLOROCYPHIDAE

Chlorocypha caligata (Selys)

Found in the same locality as the previous species, 27.XII.1957.

Family COMPHIDAE

Ictinogomphus ferox (Ramb.)

Common in Richard's Bay area, 1957 and 1959.

Lestinogomphus africanus (Fraser)

Three males and two females, Enseleni river, 21.1.1960. This species was originally described from Sierra Leone, and later found in Uganda and at the Victoria Falls (Pinhey, 1951). I have previously captured one specimen on the Limpopo River at Pafuri. The present record extends the known area of distribution of the species to the south by over 400 miles.

Paragomphus hageni (Selys)

Richard's Bay, 1959.

Family AESHNIDAE

Anaciaeschna triangulifera McL.

Three males and two females captured flying at dusk after sunset, on the outskirts of Umsingazi swamp, 27-28.XII.1957.

Anax imperator Leach.

Richard's Bay, 21.XII.1959.

Hemianax ephippiger (Burm.)

Found abundant in 1959.

Acanthagyna (Gynacantha) villosa (Grünberg)

One female collected in *Barringtonia* forest on the Enseleni river 31.XII.1957. The species has been known to occur in the Delagoa Bay area, Moçambique (Ris, 1921).

Acanthagyna (Gynacantha) manderica (Grünberg)

One male collected in *Barringtonia* forest on the Enseleni river 29.XII.1957. A species of equatorial Africa, until recently was not known to occur further south than Salisbury (S. Rhodesia), but has been found by myself to go as

far south as Port St. Johns (Balinsky, 1958). Its occurrence in Zululand is thus not unexpected.

Acanthagyna (Gynacantha) zuluensis spec. nov., Plate 1, figs. 1 and 3; figs. 8-11.

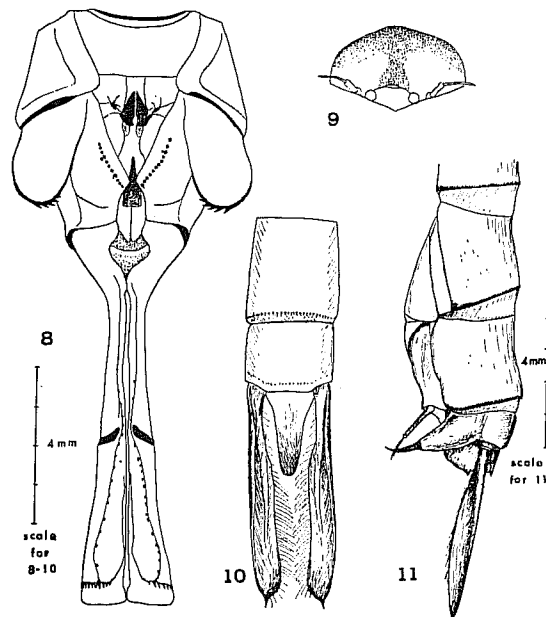
COLOURS IN LIFE: MALE. Labium salad green, brownish towards lower edge; anteclypeus dark green (grass green); clypeus and anterior surface of frons salad green, turning to brown at ridge of frons. Frons above ridge brownish yellow with distinct T figure (fig. 9), middle part of T narrow and clearly delimited, transverse part broad, rather diffuse, tapering laterally; vertex black. Antennae with light brown first segment and black flagella. Eyes dark green above, light green in lower half, turning yellow towards lateral edges; triangle posterior to eyes green; genae brownish green, occiput yellow in lateral parts, black dorsally and medially.

Prothorax pale violetish brown; meso- and metathorax mainly a bright velvet grass-green; mid-dorsal carina black, very faint shades along middle of mesepisternum (antehumeral stripes). Two brown spots: one at upper end of the humeral suture, second above metastigma, on the first lateral suture. Interalar patches grass green, but patches at base of hind wings green, bordered with blue, and last two paired patches in the middle, as well as the hindermost unpaired semicircular patch azure-blue. Legs with light brown femora and dark brown tibiae and tarsi.

Abdomen: first abdominal segment buff laterally and ventrally, black at dorso-posterior margin, second abdominal segment black and azure-blue. The blue colour is found on the upper surfaces of the oreillets and on the lateral surface of the segment above the oreillets; further, there are three transverse blue bands across the dorsum of the segment; first band narrow, at anterior edge of segment; second band interrupted dorsally but expanded before interruption; third band broadest, somewhat diffuse, bending near middorsal line to make a sort of M figure, with the apices of the M pointing forwards. Bands 2 and 3 are bordered posteriorly by transverse carinae; a narrow blue medial band starts at band 1 and ends just posterior to band 2. Third abdominal segment black but blue laterally on proximal end, and with two transverse blue markings; a vertical bar laterally on each side, just posterior to the mid-segment transverse carina with triangular broadenings at upper ends, just separated by the dorsal carina, and two transverse blue patches just before posterior transverse carina. Abdominal segments 4-7 marked with blue in the same way; patches of blue laterally at proximal ends, vertical bars broadening into triangular patches at upper ends at mid length of the segment, and transverse patches of blue before posterior end of segment; segment 8 with only lateral patches proximally; segments 9 and 10 completely dark brown. Abdomen ventrally light buff, but with dark brown stripes along the transverse carinae.

Dorsal anal appendages black, ventral appendage light brown proximally but turning dark brown at the end.

The female is very similar, though the colours are not quite as bright. On drying the green colours fade to an olive brown and the blue colours disappear to a large degree; the legs in dried specimens are ferruginous slightly darker at the knees, but without distinct dark spots at the knee joints. The wings (plate 1, figs 1 and 3) are hyaline or smoky with traces of yellow at the base of the wings. In the males there are 20-24 antenodal crossveins on the forewings and 15-18 postnodal crossveins; in the females the corresponding numbers are 22-25 and 18-20. There are most often six, but sometimes seven to eight cells in the trigon on the forewings and 9-17



Figs. 8-11. *Acanthagyna zuluensis* spec. nov. 8. Ventral view of first, second and third abdominal segment in the ♂. 9. Colour pattern on the frons of the ♂. 10. Anal appendages of the ♂, dorsal view. 11. End of abdomen of the ♀ from the left side.

(most often 12) cells in the anal loop; in the anal triangle of the male there are three cells. Pterostigma buff between black veins. Abdominal segments 1 and 2 are inflated, and segment 3 is constricted from the sides to a very extreme degree, equally in both sexes (plate 1, figs 1 and 3). The oreillets in the male are broadly rounded, elongated in a posterior direction, with very strong and sharp denticles, the tips of which are curved inwards (fig. 8); the denticles, four to six in number, are placed on the posterior edge of the oreillet, the outer edge is smooth. A row of short denticles runs on each side along the ridges bordering the genital fossa on the ventral side of the 2nd abdominal segment; the denticles are situated only on the anterior half of the ridge till the point where the edges of the genital fossa converge in a posterior direction. Where the edges expand again posteriorly, they do not bear denticles; the number of the denticles on one side is 12-17. The longitudinal ridges on the ventral side of the 3rd abdominal segment bear a moderate number of rather small denticles; most of them are situated posterior to the mid-segmental transverse carina, only a few (three to seven) lying anterior to this carina (fig. 8).

The superior anal appendages of the male are narrow in the proximal $\frac{1}{3}$ and broaden in the distal $\frac{2}{3}$, slightly curved inwards in the distal $\frac{1}{3}$; the distal ends are rounded, but each bears a long sharp point nearer the outer edge (fig. 10). The length of the superior anal appendages is about 5 mm, they are longer than the last two abdominal segments, but distinctly shorter than the last $2\frac{1}{2}$ segments. The inferior anal appendage is just short of being $\frac{1}{2}$ the length of the superior anal appendages, triangular with two tiny black denticles on the dorsal surface at the tip.

The 2nd abdominal segment of the female possesses longitudinal ridges on the sides in approximately the same position in which are situated the oreillets of the male; there are up to 10 small denticles situated on this ridge mainly in its middle part. The structure of the last three abdominal segments in the female are shown in fig. 11.

Size:	Length of abdomen including the anal appendages	Length of hind wing
♂	49-53 mm	45-47 mm
♀	49-55 mm	48.5-51 mm

Pterostigma, fore wing: 4-4.5 mm; same, hind wing 3.5-4.5 mm.

♂-Holotype: Umsingazi swamp, Richard's Bay (Natal), 1.1.1958 and ♀-allotype: same locality, 24.XII.1959, both in collection Transvaal Museum; paratypes: 1 ♂ and 1 ♀ in Musée de Congo Belge, Tervuren, 1 ♂ and 1 ♀ in Col. Fraser's collection, 1 ♂ in National Museum, Bulawayo, 2 ♂♂ and 1 ♀ in author's collection (all type material collected by B. I. Balinsky).

REMARKS. The presence of only three cells in the anal triangle, the very distinct constriction at the 3rd abdominal segment and the moderately large size of the present species exclude at once the possibility of it being

identical with any African species of *Acanthagyna* except: *A. stylata* Martin, *A. bullata* Karsch, *A. manderica* (Grünberg), *A. usambarica* Sjöstedt, *A. flavipes* Fraser, *A. nigeriensis* Gambles and *A. victoriac* Pinh. From this list *A. manderica* must be excluded, as the row of denticles along the edge of the genital fossa is continued beyond the angle at which the right and left edge approach each other most closely (this has been already noted by Gambles, 1956). *A. stylata* (Martin, 1908-9) is excluded because of its very long and narrow superior anal appendages in the male. The bright ochreous-yellow legs of *A. flavipes* exclude that species. *A. nigeriensis* is excluded because the oreillets in that species are narrow with eight to nine denticles, whereas they are distinctly rounded and with a smaller number of denticles in the present species; also the abdomen of the female in *A. nigeriensis* is not constricted at the 3rd segment, whereas it is very strongly constricted in my species. In *A. victoriac* the denticles on the edges of the oreillets are shorter and blunter than in my species; also there are many more denticles along the ventral side of the 3rd abdominal segment, especially in its anterior part, in front of the transverse carina where *A. victoriac* has 10-12 denticles on each side, whereas my species has only three to six denticles. *A. bullata* must be excluded, as it is a considerably smaller species, which nevertheless has more antenodal crossveins [25-29 according to Karsch (1891), 21-25 according to Martin (1908-9), 21-23 in specimens from the Belgian Congo, which I have examined, as against 21-25 in my species]. Also in *A. bullata* the number of denticles on the oreillets is larger than in my species, and in the female the constriction at the 3rd segment is much less pronounced than in the male, whereas in my species the constriction in the female is just as extreme as in the male. The legs of *A. zuluensis* do not show distinct dark markings on the knees which are so characteristic of *A. bullata*. Lastly *A. usambarica* to which so far as I can judge the new species bears the closest resemblance, differs from my species in the following characters:

- 1) the denticles on the oreillets in *A. usambarica* are very short, hardly more than serrations of the edge, in *A. zuluensis* these denticles are very strong, long and pointed.
- 2) As evident from the photograph in Sjöstedt's paper, the oreillets in *A. usambarica* protrude very far backward, almost reaching the angles of the hind wings, in *A. zuluensis* the distance between the tips of the oreillets and the angles of the hind wings is almost equal to the length of the oreillets themselves.
- 3) Sjöstedt states that the inferior anal appendage of *A. usambarica* does not reach the middle of the superior anal appendages. On his photograph one can see that the inferior anal appendages are very much shorter than $\frac{1}{2}$ of the superior anal appendages, and that they do not even reach the beginning of the broadened distal part of the superior anal appendages. In *A. zuluensis* the inferior anal appendage is relatively longer, and reaches well beyond the level at which the superior anal appendages become broadened.

- 4) Sjöstedt describes and figures the anterior edge of frons as being „transversely-squarish” more blunt than in *A. bullata*; in *A. zuluensis* the anterior edge of the frons is distinctly protruding in the middle (fig. 9) even more so than in *A. bullata*.
- 5) The legs of *A. usambarica* are described as yellowish brown, in *A. zuluensis* the legs are reddish brown (ferruginous).

In concluding this comparison I should like to suggest that the presence and arrangement of the denticles along the edge of the genital fossa of the male may prove to be a valuable systematic character, which would help in grouping the species inside the genus. As a number of species have been examined for this character*), it may be useful to record the following findings:

- 1) *Acanthagyna (Heliaeschna) libyana* Fraser and *A. bispina* do not have any denticles in this position.
- 2) *A. vesiculata* Karsch, and *A. villosa* (Grünberg): the denticles (only a small number) are present only posterior to the narrowest part of the genital fossa.
- 3) *A. manderica* Grünberg: the denticles are present both anterior and posterior of the narrowed part of the genital fossa, and thus form an X-like figure.
- 4) *A. bullata* Karsch, *A. nigeriensis* Gambles, *A. usambarica* Sjöstedt, *A. victoriac* Pinh. and *A. zuluensis* have the denticles only anterior to the narrowed part of the fossa, in two rows which converge in a posterior direction forming a V-like figure.

The specimens of *A. zuluensis* were collected by myself at several points in the Richard's Bay area, but always in the same type of habitat: in dense sections of forest with *Barringtonia racemosa* as the dominant tree. These sections adjoin the shores of a lake (Umsingazi Lake) or of a slowly running river (Enseleni River). As other species of the genus, *A. zuluensis* is crepuscular in its habits. One specimen was actually caught flying at dusk, the others were discovered by chasing them out of their daytime retreats amongst dense foliage in the undergrowth of the forest. Three males were captured in 1957-58 and further four males and four females were collected in 1959.

Family CORDULIIDAE

Phyllomacromia reginae (le Roi)

Common, 1957 and 1959.

*) In part by Dr J. B. Balinsky.

Family LIBELLULIDAE

Tetrathemis polleni (Sélys)

Occur in numbers in the *Barringtonia* forest along the river Enseleni, and occasionally also amongst similar vegetation in the Umsingazi swamp and the swamp near Richard's Bay Hotel adjoining the lagoon, 1957 and 1959.

Orthetrum brachiale (Beauv.)

One male at St. Lucia Bay, 1959.

Orthetrum machadoi Longfield

Richard's Bay and St. Lucia Bay, 1957.

Orthetrum falsum Longfield

Richard's Bay, 1957. St. Lucia Bay, 1959.

Orthetrum icteromelas Ris

One male, Umsingazi swamp, 1957.

Orthetrum species near **icteromelas** Ris

One male, Umsingazi swamp, 24.XII.1957.

I can not place the specimen in any of the species enumerated in Longfield's recent revision (1955). It is probably a new species, but more material must be studied before giving a final judgment.

Orthetrum trinacria (Sélys)

Caught at Umsingazi lake in 1957 and 1959.

Nesciothemis farinosum (Förster)

Richard's Bay, 1957.

Palpopleura lucia (Drury)

One female Richard's Bay, 1957.

Chalcostephia coronata flavifrons Kirby

This species is widespread in equatorial Africa from Uganda to the Ivory Coast. It has been recorded from Natal: Umbilo Road, Congella, Durban (Pinhey, 1951). Pinhey reports *i.e.* that he visited the Congella locality but could not find the species there. In the Richard's Bay area the species is quite abundant in all localities where *Barringtonia* trees grow; along the Enseleni river, around the Umsingazi lake, in the adjoining Umsingazi swamp and in the swamp reaching towards Richard's Bay lagoon. 27-31.XII.1957, 24.XII.1959.

Hemistigma albipuncta (Ramb.)

The species was fairly common in the Richard's Bay area and St. Lucia Bay area in 1957. In 1959 only one specimen was seen near the Umsingazi swamp, but not taken.

Acisoma panorpoides ascalaphoides Ramb.

Umsingazi lake and a pan near St. Lucia Bay, 1959.

Diplacodes lefebvrei (Ramb.)

Richard's Bay, St. Lucia Bay, 1957 and 1959.

Crocothemis erythrea (Brullé)

Richard's Bay, 1959.

Brachythemis leucosticta (Burm.)

Umsingazi lake 1957, 1959/1960.

Trithemis annulata (Beauv.)

Umsingazi lake, 1957, 1959.

Trithemis arteriosa (Burm.)

Especially abundant at Umsingazi lake, also on Nyalazi river, 1957 and 1959.

Trithemis pluvialis Förster

One male, Nyalazi river, 27.XII.1957.

Rhyothemis semihyalina (Desj.)

Richard's Bay, Umsingazi lake, 1957 and 1959.

Zyxomma atlanticum Sélys

It was a great surprise to find this species in Zululand, as it has been known till now only from Western Africa. In the Richard's Bay area I found it in 1957 fairly common in *Barringtonia* forest along the Enseleni river and in the Umsingazi swamp. In daytime it hides in dense foliage in the undergrowth of the forest, similar to the *Acanthagyna* species. I found it in flight at dusk after sunset. In 1959, however, I could not find the species though I looked for it in the same places. Col. F. C. Fraser kindly compared my specimens with West African ones and found them conspecific.

Zyxomma flavicans Martin.

This is another West African tropical species, described from Guinea. In the Richard's Bay area it is found in the same localities as *Z. atlanticum*, but it is somewhat more widespread. In was present in 1959 as well as in 1957. In habits *Z. flavicans* is not as distinctly crepuscular as *Z. atlanticum*. I found it flying at daytime but always under cover of dense vegetation.

Trapezostigma basillaris (Beauv.)

The species is very common in the area, 1957 and 1959. There was a mass flight of these dragonflies at Richard's Bay on the 21.XII.1959.

Trapezostigma limbata (Desj.)

Observed, though not quite as frequently, in 1957 and 1959.

***Urothemis assignata* (Sélys), figs. 12 and 16.**

One male, Richard's Bay, 23.XII.1957.

***Urothemis edwardsii* (Sélys), figs. 14 and 18.**

Common in Richard's Bay and St. Lucia Bay areas, 1957, 1959.

***Urothemis luciana* spec. nov., Plate 1, figs. 2 and 4; figs. 13, 15 and 17.**

In the red body colour similar to *U. assignata* but larger and more strongly built than both *U. assignata* and *U. edwardsii*, with eight to nine antenodal crossveins, with the dark pattern on the bases of the wings more developed; the ♂- and ♀-genitalia nearer to *U. edwardsii* than to *U. assignata*.

COLOURS IN LIFE: MALE. Labium ochre yellow with reddish anterior edge; labrum, clypeus and frons wine red; lateral edges of frons marked with brown; vertex reddish brown, occiput reddish brown; on bases of mandibulae yellow spots laterally; eyes bicoloured: top dark wine red, anteriorly becoming brown; postero-ventrally bluish grey. Prothorax reddish brown, meso- and metathorax dark wine red above, buff-brown laterally. The red goes beyond the 1st lateral suture dorsally but correspondingly there is a patch of buff brown anterior to the 1st suture in the same region. Legs black except for the coxae of all legs and the medial surfaces of the 1st femora, which are brown. Dorsal surface of abdomen wine red, except for the 1st tergite which is brown and for black dorso-medial markings on tergites 9 and 10. Underside of abdomen light brown with reddish outer edges and with a black median strip along segments 3-9 and proximal part of 10. Upper anal appendages red with blackened tips, ventral anal appendages black.

FEMALE: Labium and labrum brown, darker towards the edges; anteclypeus and clypeus yellowish brown; frons and vertex light coffee brown, lateral edge of frons lighter yellowish; occiput brown, except for lowest part of the edge behind the eye which is yellowish. Eyes sharply divided into an upper dark red segment and a lower bluish grey segment. Thorax rather uniformly buff-brown. Legs similar to those of the male but somewhat lighter, the medial surface of the second femora being also brownish, as in the 1st pair of legs. Upper surface of abdomen brown with a slight reddish tint which is very quickly lost on death. Black dorso-medial markings on segments 9-10. Ventral surface of abdomen whitish brown with black median strip. Cerci brown with blackened tips. Subgenital plate light brown.

Wings (plate 1, figs 2 and 4). In all males studied there are eight Ax on both fore wings. In the females the number of Ax on fore wings is eight-eight, eight-nine or nine-nine. Wing membrane slightly yellowish in both sexes, venation reddish in the male, brownish in the female. The bases of all four wings in both sexes with extensive pattern the colour of which is a rich reddish brown in the darker places but thins out to amber in the lighter areas. In the male the brown on the fore wings reaches to the 3rd antenodal crossvein and to the inner edge of the discoidal cell. Darker streaks are

located between the Sc and RM and between Cu and A. The cell at the base between RM and Cu is hardly tinted, the anal field is amber, but not quite to the edge of the wing. In the hind wings the colour reaches to the 4th antenodal crossvein, goes slightly beyond the discoidal cell and covers more than half of the anal loop. The darkest parts are between Sc and RM on the triangle and hypertriangle and on the anal field. The cell at the base between RM and Cu is, as in the fore wings, almost free of colour. A lighter (somewhat variable) zigzag band stretches across the anal field and anal loop. In the female the markings are less extensive and somewhat variable: on the forewings the amber colour reaches only to the 2nd antenodal crossvein and in some specimens there is hardly any colour posterior to A. In the hind wings the colour reaches only to the 3rd antenodal crossvein and just covers the discoidal cell or even leaves the tip of the discoidal cell free. The anal loop is coloured only in its narrowed proximal part, and the hyaline edge at the posterior edge of the anal field is broader than in the male (roughly two rows of cells in the male and two and a half to three rows of cells in the female). The dark colour in the female is a deeper brown. The pterostigma is similar in both sexes: fawn between black veins.

The secondary genitalia of the male (fig. 13) resembling both *U. assignata* and *U. edwardsii*, but the median process on the ventral (morphologically dorsal) surface of the penis longer, and the incision beneath it deeper (fig. 15) than in *U. assignata* (fig. 12) and in these respects the penis is more similar to that of *U. edwardsii* (fig. 14). The prongs of the vulvar scale in the female are broad and are in contact with each other in the midline (fig. 17) and in this respect resemble the prongs of the vulvar scale of *U. edwardsii* (fig. 18) and differ from the narrower, and more broadly set prongs of the vulvar scale of *U. assignata* (fig. 16).

Length of abdomen (with anal appendages): males 28-29 mm, females 25-27.5 mm. Length of hind wing: males 37-38.5 mm, females 36.5-38.5 mm. Length of pterostigma males and females 4 mm.

♂-Holotype: St. Lucia Bay (Natal), South Africa, 27.XII.1957. ♀-allotype: same locality, 21.XII.1959, both in collection Transvaal Museum; paratypes: 1 ♂ and several ♀♀ in the author's collection; 1 ♂ and 1 ♀ in National Museum, Bulawayo; 1 ♂ and 1 ♀ in Col. F. C. Fraser's collection (all type material collected by B. I. Balinsky).

REMARKS: The series of specimens on which the above description is based were collected in a very limited area on the western side of St. Lucia Bay between Nyalazi and Charter's Creek, partly along roads and on clearings between Eucalyptus plantations, which were overgrown with indigenous bush, partly in the bush adjoining the Bay (though not actually on the shores of the Bay). The males are very difficult to catch, as they fly high and settle very rarely during daytime. The four available specimens were captured as they settled to rest in the evening. The females often settle on the bushes even during daytime, and are quite easy to get. In 1957 two males and one female were collected, further two males and 11 females were collected in 1959.

The red colour of the bodies and the general similarity in wing coloration of the new species to *U. assignata* make it necessary to consider whether it is not after all only a subspecies of *U. assignata*. There are several reasons why I cannot accept such a view. The morphological differences seem to be too great. Not only is the brown pattern on the wings more widespread, but it is also of a different shade: the denser pigmented parts in *U. luciana* n. sp. are not nearly as dark as in *U. assignata*. There is a clear difference in venation: eight or nine Ax on the fore wings of the new species as against seven Ax in *U. assignata* and *U. edwardsii*. (Amongst 17 specimens of *U. edwardsii* which I have studied one female has eight Ax on one wing, another has eight Ax in both wings, but the venation in the latter specimen is somewhat irregular, the crossveins in the subcostal field not all corresponding to crossveins in the costal field). The difference in size is quite considerable: length of hind wing in *U. luciana* is 36.5-38 mm. in *U. assignata* (10 specimens) it is 33-34.5 mm.

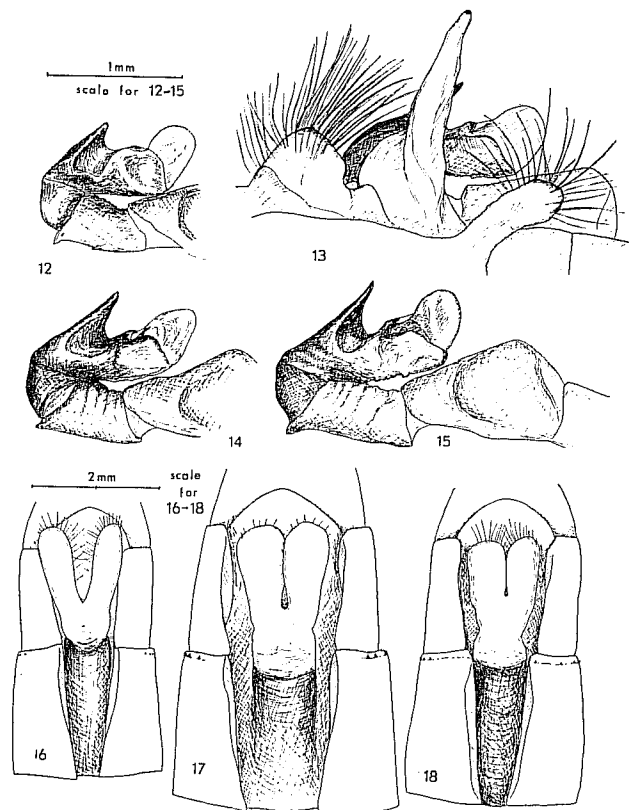
The differences in the ♂- and ♀-genitalia should be considered as being of crucial importance. In fact if one were to give prominence to the structure of the genitalia, the new species could be described as a large red *U. edwardsii*, rather than as a modified *U. assignata*.

Although I have not observed *U. assignata* in the same locality in which the new species is collected, the former species has been recorded from points both to the north and south of St. Lucia Bay. The nearest occurrence is at Richard's Bay (Pinhey, 1951, and my own record). As there are no natural barriers between Richard's Bay and St. Lucia Bay, and the distance is less than 50 miles, the sharp distinction between the two species and the absence of intermediaries would be difficult to explain if the species were not completely separate specifically and incapable of interbreeding. The fact that *Urothemis luciana* was observed in large numbers after an interval of two yeards (in 1957 and again in 1959) shows that it is a firmly established species, and not some freak variety.

I have not been able to discover the breeding places of *U. luciana*. The water of St. Lucia Bay at Charter's Creek and lower is brackish (except in years of floods) and can hardly be populated by dragonfly nymphs. Also, as mentioned above, I have not seen females flying at the water's edge.

EXPLANATIONS OF FIGURES

Fig. 12. *Urothemis assignata* (Sélys), penis, from right side. 13. *U. luciana* spec. nov., secondary genitalia of ♂, from right side. 14. *U. edwardsii* (Sélys), penis, from right side. 15. *U. luciana*, penis, from right side. 16, 17, 18. Ventral view of 8-9 abd. segments with vulvar scales in females of *U. assignata* (16), *U. luciana* (17) and *U. edwardsii* (18).



GENERAL REMARKS

The enumeration of species of dragonflies collected in the Richard's Bay-St. Lucia Bay area shows a peculiar feature of the Zululand dragonfly fauna: the presence of a number of distinctly tropical species. These are in the first place the species of the genus *Acanthagyna*, and secondly the two *Zyxomma* species, found for the first time on the eastern coast of Africa. All five species of this group occur in the Richard's Bay area in patches of *Barringtonia racemosa* forest. The complex of species inhabiting this biotope includes also *Tetrathemis polleni* and *Chalcostephia coronata flavifrons*; the last two species have been observed in Natal previously (Pinhey, 1951) and apparently without association with *Barringtonia* forest.

Another complex of dragonflies associated with a specific type of biotope in the area under consideration occurs on small semipermanent pools surrounded by grassy vegetation. These include *Lestes tridens*, *Eudallagma nigridorsum*, *Agriocnemis exilis* and *A. ruberrima*.

A third distinctly different biotope in the area is the Umsingazi lake with the following species: *Pseudagrion* species near *ubicum*, *Orthetrum trinacria*, *Nesciothemis farinosum*, *Brachythemis leucosticta*, *Trithemis annulata* and *T. arteriosa*. *Phyllomacromia reginae* were also common in the vicinity of the lake, and possibly the lake is a breeding place for the species.

There was a very marked difference between the dragonfly fauna found at Richard's Bay in 1957/58 and that found in 1959/60. Many of the more interesting species were only found during the first visit, such as *Lestes tridens*, *Agriocnemis exilis*, *A. ruberrima*, *Anaciaeschna triangulifera*, *Acanthagyna villosa*, *A. manderica*, *Orthetrum machadoi*, *O. icteromelas*, *Zyxomma atlanticum*. On the other hand some of the more common species of temperate South Africa were absent in 1957/58 but frequent or abundant in 1959/60, such as *Crocothemis erythraea* and *Hemianax ephippiger*. The difference between the two years is at least in part due to very dry weather in the spring and early summer of 1959. The smaller pools and pans which were full of water in 1957, were drying up in 1959, the pool at which *Agriocnemis ruberrima* was collected in 1957, was almost dry in 1959, and possibly the little water it held was due to quite recent rains, so that somewhat earlier the pool might have been completely dry. This would account for the absence of several species of small Zygoptera found in the biotope previously. It is suggestive that the dryer climatic conditions prevailing during one year resulted in the curtailment of the tropical and subtropical components and in a spread of the highveld components of the dragonfly fauna.

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