The Scientific Results of the Hungarian Soil Zoological Expedition to the Brazzaville-Congo*

36. The Plecoptera species Neoperla spio (Newman)

By

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One hundred and fifty two adult stoneflies collected by the Hungarian soil zoological expedition to the Brazzaville-Congo (BALOGH et al. 1965) were submitted to me for identification and comment by Dr. Z. KASZAB of the Hungarian Natural History Museum, Budapest. This paper is a report upon them and upon a somewhat larger collection of adult stoneflies from Kumba in Cameroon collected in 1952 by my friend Dr. W. L. NICHOLAS of the Australian National University.

The two collections are dealt with together as they jointly throw some light on one of the several problems that remain in the taxonomy of African stoneflies. I am most grateful to both the above gentlemen for the opportunity to examine this material.

The Collections

A) Brazzaville-Congo

a) Collection numbers *46*, *101*, *122*, *128*, *146*, *158*, *170*, *184* and *195* from Kidamba, Meya, settlement, collected from 30 October to 13 November, 1963, by lamplight; 38 ♂♂, 89 ♀♀. Of these 2 ♂♂ 3 ♀♀ were taken by lamplight not in the settlement but by the nearby Louolo River on 12 November.

b) Collection numbers *243* and *255* from Sibiti, IRHO, collected on 25 and 26 November, 1963, by lamplight; 1 ♂ 4 ♀♀.

c) Collection numbers *379*, *402*, *411*, *432* and *452* from Loudima, SAGRO on various dates from 6 to 11 December 1963; 4 ♂♂, 13 ♀♀.

d) Collection number *455* from Mont Fouari reservation, collected by lamplight, 12 December 1963; 3 ♀♀.

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Meya and Loudima are about 140 km from one another on the Kouilou River west of Brazzaville, and Sibiti is somewhat north of a line joining them and lies in the same watershed. All the specimens therefore came from the same general area except for the three females from Mont Fouari which is about 250 km to the west north-west and in the next watershed, that of the Nyanga River.

During the expedition light traps were operated at various dates between 20 October 1963 and 3 January 1964 near the city of Brazzaville but no stoneflies were caught.

B) **Cameroon**

a) Kumba, Loaiasis Research Centre, at lights on various dates August through December, 1952; 119 ♂♂ 58 ♀♀.

This appears to be the largest collection of adult African stoneflies so far made at one place, but it is not known on which dates the individuals were collected. Kumba lies about 1000 km north-west of the Brazzaville-Congo collecting area, but there are only about four watersheds between them in well-watered country. Kumba is, incidentally, the type locality, *Sub Nomen* „Johann Albrechtshöhe", of *Neoperla laticollis* KLAP. and *N. nigricauda* KLAP. which were put into synonymy with *N. spio* by HYNES (1952 *a*).

The Specimens

All the specimens belong to *Neoperla spio* (NEWMAN) as defined by HYNES (1952 *a*), and both series confirm the nocturnal behaviour of the species. As with all previous collections studied (HYNES 1952 *a*, 1952 *b*, 1961 *a*, 1961 *b*) the specimens are very variable in size, colour and form.

In both groups the colour varies from very pale to dark with dark wings and darkened femoro-tibial joints, the females have either no genital plates, a slight backward extension of the 8th sternum or a slight or well developed triangular lappet. This covers the complete range as previously reported except that no specimen in these collections has an emarginate tip to the lappet.

In the males, the genitalia are very variable along the continuous series which has been defined previously, and which has been arbitrarily divided into types *A* to *G* (HYNES 1952 *a*, 1952 *b*). In these collections only type *A*, with a wide lappet on tergum 7, was absent, and six of the type *G* specimens in the Brazzaville-Congo collections, from Kindamba, have distinctly bifid tips to the process on the 8th tergum, a variation which has so far been reported only from the Garamba National Park in the Congo (HYNES 1961 *a*).

In the Brazzaville-Congo material there was no indication that any of the genitalia types of either sex, nor the differences in degrees of colour were restricted to, or preponderant in, either early or late collections. All types appeared to occur at random among the collections. It seemed, however, apparent that, as had been suggested previously, the males with type *G* genitalia tend to be the smallest (HYNES 1952 *b*). Advantage was therefore taken of the possession of fairly large collections from two restricted and not very distant areas, to analyse this phenomenon further, and also to see if there was any correlation between colour and type of genitalia.

In this species, specimens can be fairly readily divided into three colour types on the basis of the femora and tibiae. In pale specimens both are pale, in intermediate ones the top of the tibia is darkened, and in dark ones the distal part of the femur is also dark. Size is conveniently measured as length of fore-wing, the *A*—*G* series of male genitalia are reasonably distinct as are the three conditions of the 8th sternum in the female as outlined above.

Using these criteria, tables 1 and 2 were prepared by Mrs. MARY COLEMAN, to whom I express my gratitude for the tedium of typing and measuring all the specimens. From the tables it can be seen that:

1. Females tend to be larger than males, as was already known.

2. Females with definite sub-genital plates tend to be pale, and dark-coloured females do not have plates.

3. In the Brazzaville-Congo material the females with definite sub-genital plates are generally smaller than those without plates, and those with slightly developed plates tend to be intermediate in size. This is not apparent in the Kumba material, where, however, there are only two specimens with plates.

4. Males towards the *G*-end of the genitalia series tend, in both sets of material, to be both smaller and paler than those towards the *B*-end.

One can only speculate on the significance of these facts, which have only become apparent when it was possible to examine large numbers of specimens from limited areas. Previously specimens have only been available from widely scattered areas and in relatively small numbers from each, and variability between populations has masked the trends. It is possible though that, in any one area, any factor which delays growth of an individual or, alternatively, hurries on development to maturity, after perhaps fewer nymphal instars, inhibits the full formation of pigment. Possibly also the same factor favours development of the genital plate in the female and also the formation of a process on segment 8 of the male rather than on segment 7.

This is an intriguing problem, but it is one which can only be properly investigated experimentally, and probably only in Africa.

Table 1. The numbers in each genitalia type, coloration group and size group of the specimens from Brazzaville-Congo

Sex	Genitalia type	Colour type			length of wing to nearest mm								No. of specimens
		pale	tibiae dark	tibiae and femora dark	8	9	10	11	12	13	14	15	
males	*B*		1				1						1
	C	1						1					1
	D	5	5	8		1	9	8					18
	E			3			1	2					3
	F		1	1	1			1					2
	G	11	7		9	8	1						18
females	no plate	6	19	48				13	30	22	5	3	73
	small plate	4	15	1			2	8	6	4			20
	definite plate	14	2			1	10	5					

Table. 2. The numbers in each genitalia type, coloration group and size group of the specimens from Kumba, Cameroon

Sex	Genitalia type	Colour type			length of wing to nearest mm								No. of specimens
		pale	tibiae dark	tibiae and femora dark	8	9	10	11	12	13	14	15	
males	*B*	5	8	5		2	13	2		1			18
	C	10	11	9		8	18	4					30
	D	10	4	9		7	15	1					23
	E	4		19	1	16	6						23
	F	1	1	1	1	2							3
	G	17	5		5	11	6						22
females	no plate	24	4	11			2	12	13	11	1		39
	small plate	14	3					3	11	3			17
	definite plate	2						1	1				2

ZUSAMMENFASSUNG

Über die Plecopteren-Art Neoperla spio (Newman)

Die untersuchten Exemplare von *Neoperla spio* (Newman) wurden teils von der ungarischen bodenzoologischen Expedition in Brazzaville-Congo, teils von W. L. Nicholas in Cameroon erbeutet. Der Verfasser stellt die folgenden morphologischen Bemerkungen fest: *1.* die Weibchen sind größer als die Männchen; *2.* die blaße Weibchen können gut entwickelte Subgenitalplatten tragen, bei den dunkel gefärbten Weibchen fehlen jedoch immer solche Platten; *3.* die Subgenitalplatten tragenden Weibchen erweisen sich kleiner im Congo-Material als die ohne Platten; *4.* die Männchen werden allmählich kleiner und heller nach dem G-Ende der Genitalienreihe zu.

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