## STUDIES ON THE FAUNA OF CURAÇÃO AND OTHER CARIBBEAN ISLANDS: No. 185

# THE CADDIS-FLIES (TRICHOPTERA) OF CUBA AND OF ISLA DE PINOS: A SYNTHESIS

by

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Even a few years ago, the caddis-fly fauna of Cuba remained very poorly known. The situation notably improved, especially following the study of collections made throughout the Island, either by myself, or by Cuban entomologists (BOTOSANEANU & SYKORA 1973, BOTOSANEANU 1977, BOTOSANEANU in press).

At present, somewhat less than 80 species and subspecies are known from Cuba (2 Rhyacophilidae Hydrobiosinae, 8 Glossosomatidae Protoptilinae, 6 Philopotamidae, 1 Psychomyiidae Xyphocentroninae, 6 Polycentropodidae, 6 Hydropsychidae Hydropsychinae and 3 Macronematinae, 31 Hydroptilidae, 3 Leptoceridae, 2 Odontoceridae, 4 Calamoceratidae, 5 Helicopsychidae). But we can expect some 10 additional species to be discovered. These figures are reasonably high when compared to those obtained for the other antillean Islands (see especially FLINT 1964, 1968a, 1968b): for Jamaica and Puerto Rico, both well investigated and smaller than Cuba, the figures are 39 and 32 respectively; only 27 species were quoted from Hispaniola (Haiti, certainly having a rich fauna, is still very poorly known); 44 species have been reported on the whole for the Lesser Antilles. The percentage of endemical taxa is remarkably high: 61 from the 76 total. These are species of Atopsyche Bks., Cubanoptila Sykora (genus endemical in Cuba), Cariboptila Flint, Campsiophora Flint (2 purely Antillean genera), Polycentropus Curt., Hydropsyche Pict., Smicridea McL., Leptonema Guérin, Macronema Pict., Alisotrichia Flint, Ochrotrichia Mos., Metrichia Ross, Loxotrichia Mos., Oxyethira Eat., Hydroptila Dalman, Neotrichia Mort., Oecetis McL., Marilia F. Müller, Phylloicus F. Müller, Helicopsyche Siebold.

#### CASES OF VICARIANCE (see Table)

Cuba represents – like the Antilles on the whole – a land of promise for a study of the results of geographic isolation<sup>1</sup>); investigations carried on its caddis-fly fauna allow to distinguish a lot of cases of vicariance (at the generic, specific, or subspecific level): *I*. between the Greater Antilles considered as a whole, and other areas of the Americas; *2*. between different islands of the Greater Antilles; *3*. between different natural regions of Cuba; *4*. or even within the limits of one of these natural regions. Selected are here a few examples offered by the Cuban fauna for illustrating these 4 different cases (abbreviations: C. = Cuba; Occ. = Occidental region; Or. = Oriental region; Centr. = Central region; I.P. = Isla de Pinos; see Fig. 10).

I. – Chimarra guapa Bots. (C.) – C. patosa Ross (Perú); Loxotrichia glasa Ross (I.P., southern U.S.A.) – L. dalmeria Mos. (México); Oxyethira alaluz Bots. (C.) – O. maya Denn. (Georgia, Florida); Hydroptila medinai Flint (C., Puerto Rico) – H. mexicana Mos. (México); Neotrichia iridescens Flint (Greater and Lesser Antilles) – N. olorina (Mos.) (México).

When compared to the trichopteran fauna of the neighbouring zones of Continental America, that of Cuba is clearly distinct through some positive features, but especially through some negative ones, being (like that of the other Antilleans) a notably impoverished fauna. The Hydrobiosinae are represented only by a very low number of species belonging to only one genus, *Atopsyche*. The Protoptilinae form a rather good bunch of species, belonging to only 3

<sup>1)</sup> Ross (1967) says that "... the inter-American and circum-Caribbean area has been one of the World's most prolific hotbeds of evolution and speciation", and that "The geotectonic oscillations of the inter-American area can ... be considered a speciesmaking machine of unusual efficiency".

genera, all of them endemical for the Greater Antilles. The Chimarra are relatively few but phyletically rather varied. The Polycentropodidae are rather well represented (2 Antillopsyche and 3 Polycentropus).

One of the most remarkable positive features is the presence of a group of 4 nearly related Hydropsyche (these are – together with 2 species from Hispaniola - the only representatives of the genus in the Antilles, the genus being otherwise absent from South America). Excepting genus Alisotrichia, present with 5 species at least, the hydroptilids of the "Leucotrichia-group", well represented elsewhere, are practically lacking. The list of the remaining hydroptilids is reasonably long and "normal", but the Hydroptila, so much diversified for instance in México, are represented only by a small number of species belonging to the great "consimilis-group"; it is between the hydroptilids, too, that some of the most phyletically isolated Cuban species can be found: Ochrotrichia insularis Mos., O. islenia Bots., or the 3 species of Neotrichia (alata Flint, pequenita Bots., pinarenia Bots.). There are neither Brachysetodes nor Triplectidinae among the Leptoceridae. No special comment is necessary for the Odontoceridae or for the Calamoceratidae. A certain "lustre" is conferred to the Cuban fauna by the Helicopsyche: at least 5 species (but probably 1 or 2 more), one of them -H. granpiedrana Bots. & Syk. - being particularly isolated.

2. – Atopsyche vinai Syk. & Bots. (C.) – A. taina Flint (Hispaniola); Chimarra cubanorum Bots. (C.) – C. spinulifera Flint (Hispaniola); Antillopsyche wrighti Bks. (C.) and A. aycara Bots. (C.) – A. tubicola Flint (Puerto Rico); Alisotrichia fundorai (Bots. & Syk.) (C.) – A. hirudopsis Flint (Puerto Rico) and perhaps A. argentilinea Flint (Jamaica); Ochrotrichia insularis ayaya Bots. (C.) – O. insularis insularis Mos. (Jamaica); Hydroptila selvatica Bots. (C.) – H. ancystrion Flint (Jamaica). Several cases of incipient subspeciation have been discovered (Hydroptila, Oxyethira).

The affinities between the Cuban fauna and that of each of the other islands of the Greater Antilles, are approximatively of the same order. 3. - The cuban geographer Nuñez-JIMÉNEZ (1972) divided Cuba in 5 "natural regions": Occidental, Central, Camagüey-Maniabon, Oriental, and Isla de Pinos. This division is certainly warranted, as shown also by the caddisfly fauna. With the exception of the Camagüey-Maniabon region (almost no known caddis, and certainly very poor fauna), each region possesses a fauna including a number of characteristic elements. The richest and best characterized region is the Oriental one: 32-33 taxa known exclusively from this region. The Occidental region follows at a good distance, with 8-9 taxa. 5 taxa are exclusively known from the Central region, and 2 from Isla de Pinos. All this very well reflects the geomorphological, geological, and hydrological peculiarities of the different regions.

Rather frequently, a species inhabits Occ. + Centr. (4 cases), Occ. + I.P. (3 cases), or these 3 regions together (2 cases); there are 4 species inhabiting Or. + Centr.; several species are widely distributed throughout the Island, and the following ones may be considered as being the most frequent and widely distributed: Chimarra (Curgia) pulchra (Hag.), Smicridea comma Bks. (with some doubt! see further below), Neotrichia iridescens Flint, Nectopsyche cubana (Bks.), Oecetis inconspicua (Walk.). To come up again to the vicariants, this time between different natural regions, the following examples will be guoted: Cariboptila soltera Bots. (Occ.) - C. guajira Bots. and C. poquita Bots. (Or.); Macronema gundlachi Bks. (Occ. + Centr.) - M. tremenda Bots. (Or.); Alisotrichia flintiana Bots. (Or.) - A. cimarrona Bots. (Occ.); Ochrotrichia caramba Bots. (Occ., Or.) - O. villarenia Bots. (Centr.); Metrichia espera Bots. (Occ.) - M. cafetalera Bots. (Centr.) - M. munieca Bots. (Or.); Phylloicus chalybeus chalybeus (Hag.) (Or.) - P. chalybeus ssp. (Occ. + I.P.); Helicopsyche comosa Kings. (Occ.) - Helicopsyche n. sp. prope comosa - may be lutea Hag. (Or.).

4. - A remarkable case of non-geographic vicariance is that of two very nearly related species: *Alisotrichia chiquitica* Bots., and *A. alayoana* Bots. Both of them are inhabitants of the Oriental region but they apparently never occur together in the same water course (competitive exclusion?).

## TAXONOMICAL AND OTHER PROBLEMS

I have provisionnally reported most of the Smicridea taken in Cuba to the species comma Bks.; but I am forced to say that practically each locality, or group of localities, has given a slightly different morphological type, so that the specific determination remains doubtful, especially in the absence of dry specimens; Dr. O. S. FLINT, jr., proposes to find the solution of this puzzle. On the other side, a quite similar problem is that of a lot of *Helicopsyche* "populations" which in my opinion should be attached to the "haitiensis-group" (according to Prof. H. H. Ross who is studying my Cuban *Helicopsyche*: "They are definitely the most puzzling collections of *Helicopsyche* I have ever studied").

The occurrence in rather many Cuban Trichoptera of androconial formations and of specialized hairs should also be emphasized. For instance, Cubanoptila muybonita Bots. is, as far as I know, the only described Protoptilinae to have in the fore wings of the  $\mathcal{J}$  a wide zone covered with small, highly specialized hairs; Ochrotrichia caramba Bots., and O. villarenia Bots. are probably the only representatives of the genus to have scales in the fore - and hind wings of the  $\mathcal{A}$ ; Oecetis maspeluda Bots. is readily distinguished by the groups of fine black hairs in the hind wings  $(\mathcal{J}, \mathcal{Q})$  as well as by the occurrence  $(\mathcal{J})$  of a very long penicillus of black and roconial hairs inserted at the base of the anterior femur; the 33 Helicopsyche of the "haitiensis-group" taken in at least one locality in the Oriental region, have on their anterior wings a round androconial area covered with black scales; Helicopsyche comosa Kings. and a new, not yet described, species, are certainly unique in the limits of the genus, by the dense covering of long hairs on their gonopods.

## GEOGRAPHICAL DISTRIBUTION (SEE TABLE)

The close analysis of the geographical distribution on one side, of the "sister relationships" on the other side, leads to the following conclusions (see also Ross 1967 and FLINT 1977).

a) – A great number of species bear a quite distinct "Antillean stamp", belonging to genera or to species groups which are strictly

Antillean (or even Cuban). Some examples: all the Protoptilinae, Chimarra (C.) cubanorum Bots. and C. (C.) garciai Bots., the two Antillopsyche, Polycentropus nigriceps Bks. and P. turquino Bots, Alisotrichia fundorai (Bots. & Syk.), A. chiquitica Bots. and A. alayoana Bots., Ochrotrichia insularis ayaya Bots. and O. islenia Bots., Helicopsyche granpiedrana Bots. & Syk.

b) - If the somewhat more remote affinities of the taxa are also considered, we find that, in many instances, the taxa show more or less distinct relationships with elements of continental Central America and/or of S (especially SE) North America (if there is not simply identity). Some examples: Polycentropus criollo Bots., all the Hydropsyche, Leucotrichia cf. tubifex Flint, Ochrotrichia caramba Bots. and O. villarenia Bots., Orthotrichia americana Bks. and O. cristata Mort., Loxotrichia glasa Ross, the 5 Oxyethira, the 4 Hydroptila, all the Helicopsyche excepting granpiedrana.

c) – On the contrary, the taxa certainly or possibly belonging to trends of South American origin, are extremely seldom, but nevertheless highly interesting. Examples: Atopsyche cubana Flint and A. vinai Syk. & Bots., Chimarra (Curgia) pulchra (Hag.) and C. (Curgia) alayoi Bots., C. (C.) guapa Bots. It is now a demonstrated fact that the trichopteran fauna of Cuba does not belong to the "faunal circle" represented in the Lesser Antilles + northern South America + southern continental Central America, but to that including the Greater Antilles + southern North America + northern continental Central America.

Much interest is being now displayed for the Mexico Bay-Caribbean Sea areas, including much geological, geomorphological, and paleogeographical research, the results of these studies having implications on the problem of the origin and evolution of the fauna inhabiting the lands of the area. More and more publications are accumulating on this item (see, for instance, the comprehensive paper of ROSEN 1975), with conclusions often being extremely divergent depending on the group taken into account, on the more or less sound character of the study, on the geological and paleogeographical theories used as "starting point", and of the more or less fanatical attachment to a certain theory. What is now of outmost importance, is to obtain the most possible information from the many-sided investigation of as varied groups as possible. The results obtained up to the present from the study of an "excellent" group like the caddisflies, entitle us to consider as being the most plausible the following scheme for the origin and evolution of the Greater Antilles and of their faunas: ejection in the direction of the Atlantic of a "proto-Antillean kernel" starting from continental Central America; fragmentation of this "kernel"; repeated contacts between its different fragments, as well as between them – and especially Cuba – and Florida and the neighbouring areas, México, and northern continental Central America; possibility of penetration, at certain moments, of lineages starting from northern South America, via the stepping stones represented by the Lesser Antilles. Dispersal (+ dispersion) on one side, geographic isolation on the other side, played equally significant parts in the building up of the present caddisfly fauna.

## ECOLOGY (see Plates I-IV)

As far as the ecology is concerned, the following ideas should be considered only as "landmarks". The mountains of the Oriental region, with their dense hydrographic network, and still protected by a primary or secondary forest cover, are inhabited by the richest and the most diversified fauna. Unfortunately, almost nothing is known about the Trichoptera of an altitudinal zone comprised between 1000 and 2000 m (the highest elevation) which is often practically inaccessible. The Oriental mountains are followed by those of the Occidental region, then by Sierra Escambray in the Central one. The remaining areas of Cuba have a considerably impoverished fauna, with region Camagüey-Maniabon being the poorest. Industrial water polution is almost inexistent, but the deforestation has certainly represented a negative factor. A "good river" or "good stream" may shelter as many as 15 species, perhaps even a little more. The Crenal seems to be devoid of Trichoptera - anyway I believe that there are no crenobiont species. It is not yet possible to distinguish between the fauna of the Rhithral and that of the Potamal. The hygropetric elements are well represented in the different types of running water. The fauna of the standing waters is

generally very poor and monotonous (yet huge marshy areas, like Ciénaga de Zapata, are still poorly known). Most of the species are attracted at artificial lights.

#### FINAL NOTES (see Figs. 11–15)

I take this opportunity to rectify an error, in the paper of BOTO-SANEANU & SYKORA 1973: the species described as Oxyethira fundorain. sp., obviously belongs to the genus Alisotrichia Flint, as proved by the detailed illustration of the  $\mathcal{J}$  genitalia (Fig. 11). I give also detailed drawings of the genitalia of Loxotrichia janella Denn. (Fig. 12), L. glasa Ross (Fig. 13), Oxyethira florida Denn. (Fig. 14), and Nectopsyche cubana (Bks.) (Fig. 15).

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#### TABLE

## THE TRICHOPTERA OF CUBA AND OF ISLA DE PINOS

(Our knowledge of the Cuban Smicridea, Phylloicus and Helicopsyche, is still rather far from being satisfactory.)

- I. Taxa: endemical genera, species, and subspecies in SMALL CAPI-TALS.
- II. Distribution in Cuba and Isla de Pinos: Oc = occidental; Ce = central; Or = oriental; Pi = Isla de Pinos. ("Natural regions" according to A. Nuñez-Jiménez.)
- III. Distribution outside Cuba.
- IV. "Nächstverwandte Schwestergruppe".
- V. Somewhat more remote affinities.
- VI. Concise characterization of affinities + present distribution + supposed origin: It was intended to afford a synoptic characterization of a species, a species complex, of a genus, resulting from the interpretation of the available data on their distribution and affinities. For instance:

Antill. means a quite distinctive Greater Antillean character,

without any distinguishable "tendencies" towards the fauna of other zones of America. Antill. means an Antillean character with "open gates" towards N. America (above), continental Central America (left side), and the Lesser Antilles (right side), but with no apparent relationships to the S. American fauna (below). Centr. Amer. – Antill. means a distinct Centroamerican-Antillean character, with only slight possible relations to N. America.



Fig. 10. Division of CUBA into "natural regions", according to A. NUÑEZ-JIMÉNEZ.

IV	Antill.		Antill.	Antill.
Λ	The mainly Antillean "batesi group": species known from Hispaniola, Jamaica, Puerto Rico, from continental C. America, and with a very primitive member - alconura	Access - Marken and Programmer of the species-group may have differentiated either in S. America, or in C. America. Genus distributed from Arizona to Argentina.	uba	· ·
IV	A . conventica l'lint (Hispaniola) ?	A. taina Flint (Hispaniola)	Genus confined to C	The other known species of the genus are: orophila Flint (Puerto Rico), ja- maicensis Flint (Ja- maica), aurulenta Flint, hispaniolica Flint, and calcigeni- ca Flint (Hispa- niola).
III				
п		0r0	0r Ce 0c Pi 0r Ce 0r	0r 0r
Ι	Rhyacophilidae Hydrobiosinae Atopsyche сивама Flint	<i>Atopsyche</i> vinal Syk. & Bots. Glossosomatidae Protoptilinae	CUBANOPTILA CUBANA Syk. CUBANOPTILA PURPURBA Syk. CUBANOPTILA MUYBONITA Bots. CUBANOPTILA MADREMIA Bots.	Cariboptila POQUITA Bots. Cariboptila GUAJIRA Bots. Cariboptila SOLTERA Bots.
	<b>-</b>	7	<b>604</b> 50	<b>N 8 6</b>

IV	Antill.		Antill. 7		Antill.	
V				Certainly related, though not very close (FLINT in litt.: " might belong to the Antillean <i>puchwa</i> group"). Perhaps (es-	pecially alayor) related to C. moselyi Ross (Brasil): accord- ing to Ross, this is "the most primitive known species of Chimawa" and from an an-	cestral form such as this, there arose the American sub- genus <i>Curgia</i> . Other Antillean <i>Curgia</i> species: <i>argentella</i> (Ja- maica), <i>braconoides</i> (Hispa- niola), <i>albomaculata</i> (Puerto Rico).
IV	The other known species of the genus are: <i>pedophila</i> Flint (Puerto Rico), <i>ara-</i> <i>wak</i> Flint (Jamaica).	According to FLINT, this species (3 un-	known?) belongs to the same group as those listed below under <i>cubanorum</i> and <i>garcia</i> i	,		
III						
II	- J- J-	:			Or Ce Oc Pi	   
Ι	) Campsiophora MULATA Bots.	Philopotamidae	1 <i>Chimarra</i> MOESTA (Bks.)		2 Chimarra PULCHRA (Hag.)	3 <i>Chimarra</i> ALAYOI Bots.
i			-			÷.

	I	II	III	IV	v	VI
14	Chimarra GUAPA Bots.	Or———		<i>C. patosa</i> Ross (Perú)	The "patosa group" comprises, besides patosa, just a few known species from the Ama- zon system. It is possible that these two	S. Amer.
				C shimulitora	species, together with spinu-	
15	Chimarra CUBANORUM Bots.	Or		Flint (Hispaniola)	Flint, puertoricensis Flint,	Antill.
16	Chimarra GARCIAI Bots.	Or — — —		C. machaerophora Flint (Jamaica)?	constitute one Antillean species group. See also (above) C. moesta.	
	Psychomyiidae Xyphocentroninae					
17	Xyphocentron cubana (Bks.)	Or Ce Oc —	Hispaniola, Puer- to Rico (if really identical with <i>haitiensis</i> Bks.).	. ?	Species of the genus are found from SW USA south through S. America, including the Greater and Lesser Antilles; they are more or less nearly related to each other. Genus related to <i>Melanotrichia</i> (Oriental Region).	Antill.
	Polycentropodidae					
18	Cernotina sp.	Or				
19 20	Antillopsyche WRIGHTI Bks. Antillopsyche AYCARA Bots.	— Ce Oc — — Ce — —		} <i>A. tubicola</i> Flint } (Puerto Rico).	Genus confined to the Greater Antilles. Seemingly closely related to <i>Pseudoneureclipsis</i> (mainly Oriental Region).	Antill.

	I	II	III	IV	v	VI
<u>e</u>				Within the "nigriceps group" seems to be the closest to the ancestral form; sister-group: the		
21	Polycentropus NIGRICEPS Bks.	Or Ce Oc —		remaining 7 known species of this group.	Members of the purely Greater Antillean " <i>nigriceps</i> group", with 8 known species.	Antill.
22	Polycentropus turguino Bots.	Or — — —		P. jeldesi Flint (Hispaniola); but also marcanoi Flint (Hispanio- la), and jamaicen- cis Flint (Lumpico)		
23	Polycentropus CRIOLLO Bots.	Or		sis Fint (Jamaica)	Clearly belonging to the ex- clusively N. American group known as "confusus group" or "maculatus group", and comprising, besides criollo, 7 N. American species. Criollo is perhaps the most specialized.	N. Amer.
	Hydropsychidae Hydropsychinae					
24	Hydropsyche CALOSA Bks.	?Or		Nearly related species, forming a cluster.	According to Ross & UN- ZICKER they represent a dis-	
25	Hydropsyche CUBANA Flint	Or — — —		The sister-group is possibly: batesi Flint + carinifera Flint (both from Hispaniola). There	tinct genus: <i>Calosopsyche;</i> I do not agree!	Antill.

	T I	II	III	IV	$\mathbf{v}$	VI
26	Hydropsyche DEARMASI Bots.	Or — — —		are no Hydropsyche		
27	Hydropsyche DARLINGTONI Flint	Ce		Antillean islands, or in S. America.		
28 29	Smicridea comma Bks. Smicridea OBESA Bks.	Or——	Hispaniola	j or o. rimoriou		
	Hydropsychidae Macronematinae					
30	Leptonema POEYI (Bks.)	Or———				
31	Macronema GUNDLACHI Bks.	— Ce Oc —		M. tremenda Bots.	These three form a distinct	
32	Macronema tremenda Bots.	Or — — —		M. gundlachi Bks. (Cuba) + matthew- si Flint (Puerto Bico).	ive species group, possibly be- longing to "the <i>lineatum</i> - sec- tion of the genus".	Antill.
	Hydroptilidae			L gomeni Flint	These 2 species form a sub	Contr -
33	Leucotrichia sp. (may be tubifex Flint)	Or ———	if really <i>tubifex</i> : Hispa- niola, Jamaica, Puerto Rico	(Hispaniola)	group in the "melleopicta group", which includes other 4 known species, all from con- tinental C. America (only one of them also from Texas and Arizona).	America Antill.
34	Alisotrichia FUNDORAI (Bots. & Syk.) = Oxyethira f.	— Ce — —		A. hirudopsis Flint (Puerto Rico), and possibly also A. argentilinea Flint (Jamaica)	Members of the "typical sec- tion" of the genus, to whom also the following 4 Cuban species belong	Antill.

	I	II	III	IV	v	VI
35	Alisotrichia Flintiana Bots.	Or		A. cimarrona Bots.	This pair of very nearly relat- ed species, is nearly related to the pair alayoana-chiquitica; but cimarrona and flintiana	Antill
36	Alisotrichia c i m a r r o n a Bots.	——Oc—		A. flintiana Bots.	are also not far from A. oro- phila Flint (Dominica), and possibly also from A. lobata Flint (Dominica)	<u></u>
37	Alisotrichia CHIQUITICA Bots.	Or — — —		A. alayoana Bots.	This pair of very nearly relat- ed species, is nearly related to the pair cimarona-tlintiana	
38	Alisotrichia ALAYOANA Bots.	Or — — —		A. chiquitica Bots.	but does not show relation- ship with the 2 above men- tioned Dominican species. These 2 species form a small subgroup in the "major group <i>xena</i> "; this group ("the simplest" of the genus) in-	Antill.
<b>39</b>	Ochrotrichia CARAMBA Bots.	Or — Oc —		0. villarenia Bots.	cludes at least 12 other species, inhabiting either the U.S.A., or some part of continental C. America, or one of the Greater or Lesser Antillean islands. According to FLINT (i.l.), <i>villarenia</i> is "closest to O.	Antill.
-40	Ochrotrichia VILLARENIA Bots.	Ce		0. caramba Bots.	ponta Flint (Dominica), and with O. lobifera Flint (Jamai- ca) and O. marica Flint (P. Rico) would seem to form a distinctive species group".	

I	II	III	IV	Λ	IV
Ochrotrichia insularis Mos. ssp. A Y A Y A Bots.	0r — — —	0. insularis insularis Mos.: Jamaica	The species does not seem to have any close relation- ship with any other known spe-	Anyway, these 2 species do nol belong to the "major group zena" (see above) which in- cludes all the remaining known Antillean species of Orbiticitia	Antill
Ochrotrichia ISLENIA Bots.	id		Another seemingly very isolated species.		Antill. (I. de Pinos)
Metrichia ESPERA Bots.	0c			Possibly a few small clusters of species inhabiting either C. America (some of them also the SW part of USA), or the Lesser Antilles. Species of the genus have been found from	]
Metrichia m UNIECA Bots.	0r — — —		<i>M. yalla</i> Flint (Jamaica)	the SW part of the USA throughout C. America and the Antilles, and again from	Antill.
Metrichia cafetalera Bots.	— Ce — —			Perú, NW Argentina, and C. Chile, with the greatest div- ersity in C. America and the Antilles. Possibly replaced in	
Orthotrichia americana Bks.	— Ce Oc Pi	USA: Columbia		the Ancient World by genus Microptila.	
Orthotrichia cristata Mort.	Or Ce — —	through Texas, Virginia and Florida. British Colum- bia and Illinois through Florida; Jamaica.	There are no Ortho- trichia on the re- maining Antillean islands or in S. America		N.Amer.

I     I     II     II     IV     V       1     1     1     1     1     V     V       1     1     1     1     1     V     V       1     1     1     1     1     V     V       1     1     1     1     1     V     V       1     1     1     1     1     V     V       1     1     1     1     1     V     V       1     1     1     1     1     V     V       1     1     1     1     1     V     V       1     1     1     1     1     V     V       1     1     1     1     1     V     V       1     1     1     1     1     1     V       1     1     1     1     1     1     1       1     1     1     1     1     1     1       1     1     1     1     1     1     1       1     1     1     1     1     1     1       1     1     1     1     1     1     1       1	Ν	Antill.		N. + Centr. America			N. Amer- Antill.
I     I     II     II     II     IV       8     Loxotrichia janella Denn.     Or Ce Oc - Florida through     L. attea Mos. (SW)       9     Loxotrichia janella Denn.     Or Ce Oc - Florida through     L. attea Mos. (SW)       9     Loxotrichia gu ELIND A Bots.     Or     Florida through     L. attea Mos. (SW)       9     Loxotrichia gu ELIND A Bots.     Or     Eraster and Les.     Easter Antilles.       9     Loxotrichia gu ELIND A Bots.     Or     Eraster Antilles.     Entit (Puerto Rico and Jamaica).       1     Loxotrichia glasa Ross     Or     Eraster Mos. +     L. attea Mos. +       1     Loxotrichia glasa Ross     USA : Okla,     L. attea Mos. +       1     Loxotrichia glasa Ross     Denoisiana,     Mestroricensis       1     Loxotrichia glasa Ross     Ce Oc -     Jamaica).       1     Loxotrichia glasa Ross     Denoisiana,     Mestroricensis       1     Donisiana,     Lotter Rico,     Latter Mos. +       1     Lower Loss     Lower Loss     Latter Mos. +       1     Donisiana,     Mestroricensis     Latter Mos. +       1     Donisiana,     Mestroricensis     Latter No. +       1     Donisiana,     Mestroricensis     Mestroricensis <t< th=""><th>Λ</th><th>Besides the species mention- ed in the other columns, the</th><th>genus has only one other known species: <i>zilaba</i> Mos. (Brasil).</th><th></th><th>True relationships not always very clear. But all of them possibly belonging (together with the Jamaican simulatrix</th><th>Flint) to one species group having as "kernel" the com- plex <i>pallida</i> (Bks.) (widely distributed in the USA) +</th><th><i>maya</i> Denn. (Georgia and Florida) + <i>arizona</i> Ross (Ari- zona). At the root of this group: perhaps species like O. <i>aculea</i> Ross (Okla., N. Mexi- co). O. <i>tega</i> seems to be the most independent of these</th></t<>	Λ	Besides the species mention- ed in the other columns, the	genus has only one other known species: <i>zilaba</i> Mos. (Brasil).		True relationships not always very clear. But all of them possibly belonging (together with the Jamaican simulatrix	Flint) to one species group having as "kernel" the com- plex <i>pallida</i> (Bks.) (widely distributed in the USA) +	<i>maya</i> Denn. (Georgia and Florida) + <i>arizona</i> Ross (Ari- zona). At the root of this group: perhaps species like O. <i>aculea</i> Ross (Okla., N. Mexi- co). O. <i>tega</i> seems to be the most independent of these
I     I     II       I Lorotrichia janella Denn.     Or Ce Oc     Florida through Panamá; all the Greater and Les- ser Antilles.       I Lozotrichia glasa Ross     Or       I Lozotrilia.     Or       I Lozotrichia glasa Ross     Or       I Lozotrichia glasa Ross     Or       I Lozotrichia at a La Lu z Bots.        I O syethira ALALU z Bots.	IV	L. azteca Mos. (SW of USA, C. Ameri- ca, Lesser Antilles, Suriname) + L. <i>puertoricensis</i> Flint (Puerto Rico and Jamaica).	L. janella Denn. + L. azteca Mos. + L. puertoricensis Flint.	L. dalmeria Mos. (México).		0. palitida (Bks.) (widely distrib. in the USA). 0. maya Denn. (Georgia,	introduced to Hawail). O. arizo- na Ross (Arizona).
I     I       I Lozotrichia javella Denn.     Or Ce Oc       I Lozotrichia gu E LIND A Bots.     Or       I Lozotrichia glasa Ross     Or       I Lozotrichia glasa Ross     Or       I Lozotrichia glasa Ross     Or yethira tega Flint       I Ozyethira tega Flint     Or Ce Oc       I Ozyethira cirrifera Flint     Or Ce Oc       I Ozyethira ALALUZ Bots.     Ce Oc	III	Florida through Panamá; all the Greater and Les- ser Antilles.		USA: Okla, Georgia, Louisiana, Florida	J amaica ; Dominica perhaps ssp.	Jamaica, Puerto Rico, Dominica.	·
I Lozotrichia janella Denn. Dozotrichia gUELINDA Bots. Lozotrichia glasa Ross Ozyethira tega Flint Ozyethira cirrifera Flint Ozyethira ALALUZ Bots.	II	Or Ce 0e —	0r		— Ce Oc —	Or Ce Oc —	- Ce 0c -
	I	3 Loxotrichia janella Denn.	9 Lozotrichia guelinda Bots.	) Lozotrichia glasa Ross	l <i>Oxyethira tega</i> Flint	2 <i>Oxyethira cirrifera</i> Flint	3 Oxyeihira alaluz Bots.

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	Ι	II	III	IV	Λ	Ν
54	Oxyethira florida Denn.		Florida		species. O. campesina is also rather original, but not very	
55	<i>Oxyethira</i> campesina Bots.	Or Ce—			distant from <i>O. florida</i> and <i>O. simulatrix</i> . <i>O. alaluz</i> and	
					O. cirrifera are doubtless very	
					close to <i>pallida – maya – ari-</i>	
					zona (the sister of alaluz is	
					maya).	
56	Hydroptila SELVATICA Bots.	0r   0c		H. ancistrion Flint	All belonging to the important	
				(Jamaica)	"consimilis group" with spe-	
57	<i>Hydroptila medinai</i> Flint	Or Ce Oc —	Puerto Rico	H. mexicana Mos.	cies known from N. America,	
				(México)	continental C. America, the	
					Greater and the Lesser Antil-	
58	Hydroptila "N. SP. Bots.	0r		H. martorelli Flint	les, and slightly represented.	Centr.
	near martorelli"			(Puerto Rico)	also in Suriname (area of	Amer
					greatest species abundance:	Antill.
59	<i>Hydroptila</i> "pseudomeralda	Or Ce Oc Pi		H. meralda Mos.	perhaps México). Apparently	 
	Syk. i.l."			(México).	replaced in the Old World by	
					the sparsa-group.	
3	Neotrichia iridescens Flint	Or Ce Oc Pi	Greater and	N. olorina (Mos.)	Members of a species group	
			Lesser Antilles.	(México).	which was considered by	
					Mosely as representing the	۰.
61	<i>Neotrichia alata</i> Flint	0r	Jamaica	Each of them	. genus Exitrichia (species in	
				probably without	the USA, in C. America, in	
62	Neotrichia PEGUENITA Bots.	Or Ce – –		any very close	Brasil).	
3	Neotrichia PINARENIA Bots.	  00  -	·	relative.		

	1	п	III	IV	Λ	IV
	Leptoceridae					
<b>2</b>	Nectopsyche cubana (Bks.)	Or Ce Oc Pi	Jamaica(perhaps not quite identi-			
65	Oecetis inconspicua (Walk.)	Or Ce Oc Pi	Widely distri- buted over N. and C. America			
Ş	Oecetis MASPELUDA Bots.	— — Oc Pi				
	Odontoceridae					
69 68	Marilia WRIGHTI Bks. Marilia scuddert Bks.					
	Calamoceratidae					
6 a 6	Phylloicus СНАLYBEUS СНАLYBEUS (Hag.) Phylloicus СНАТУВЕИS	0				
8 م 3	Phylloicus CUBANUS Bks.	— — 0c Pi Or Ce Oc —		P. pulchrus Flint		
71	Phylloicus superbus Bks.	0r — — —		(Fuer to Mico) F		
	Helicopsychidae					
72	Helicopsyche GRANPIEDRANA Bots. & Syk.	0r — — —			Maybe the most primitive species of the genus; appa- rently not having any close relatives.	Antill. (CUBA)

IV				Antill	Centr. A merica	POT TOTTU					
Λ	According to Ross (in litt.): "They are definitely the most puzzling collections of <i>Heli</i> -	<i>copsyche</i> I have ever studied. As a result, I am still uncer-	tain how many species are present. At the moment I	would say at least four, with a possible two more. The male	genitalia of all are remark-	drosa Ross and planata Ross	One can safely say that the Cuban species form a dis-	tinctive, tight complex al- lied most closely to species	now occurring in Mexico".	In my opinion: they belong to the complex "haitiensis-	group'' (Antillean and Mexi- can species).
IV							Certainly forming a pair of sister-	entrode			
III							if really identical	with <i>lutea</i> : Hispaniola		-	<b>·</b>
II	0r	0r — — —			č		0r				
Ι	Helicopsyche H A G B N I Bks.	Helicopsyche CUBANA Kings.				nencopsyche COMOSA IMINS.	Нейсорѕуске N. S.P. ргоре	comosa (= lutea Hagen?)			
	12	74			ľ	C C	76				



Fig. 11. Alisotrichia fundorai (Bots. & Syk.), & genitalia. - a. dorsal; b. ventral (only VIIIth segment and apical appendages freely overhanging beneath it); c. lateral (phallus omitted); d. phallus dorsal.



Fig. 12. Loxotrichia janella Denn., & genitalia. - a-d: specimen from Río Mogote. a. lateral; b. dorsal; c. ventral; d. phallus. e-h: specimen from Río Yumuri, some details. e. Xth segment, lateral; f. "root" of gonopode, lateral; g. apex of gonopode, lateral; h. apex of gonopode, ventral.



Fig. 13. Loxotrichia glasa Ross, & genitalia. - a. lateral; b. dorsal (only 1Xth and Xth segments, and phallus); c. ventral (distal limit of VIIth stervite, VIIIth segment with its lobes, "gonopodial plate", and apex of Xth segment).

Fig. 14 Oxyethira florida Denn., - a-d: ♂ genitalia. a. lateral; b. dorsal (partia representation of VIIIth and IXth segments); c. ventral; d. phallus, dorsal. e-f: ♀ genitalia, in lateral and ventral view.





Fig. 15. Nectopsyche cubana Bks., & genitalia. - a. lateral; b. ventro-lateral lobes of IXth segment, ventral; c. left gonopode from behind.



Plate I. Río MANANTIALES (Soroa, Pinar del Río), May 1973: Cariboptila soltera Bots., Chimarra pulchra Hag., Alisotrichia cimarrona Bots., Metrichia espera Bots., Hydroptila medinai Flint, Helicopsyche comosa Kings., Helicopsyche possibly n. sp., etc.



Plate II. Río Mogore (Matias, foot of Sierra Maestra, Oriente), March 1973: Cubanoptila purpurea Syk., Campsiophora mulata Bots. Chimarra pulchra Hag., Alisotrichia alayoana Bots., A. flintiana Bots., Neotrichia iridescens Flint, Loxotrichia janella Denn., Hydroptila n. sp. Sykora in litt., Oxyethira cirrifera Flint, O. campesina Bots., Smicridea cf. comma Bks., Hydropsyche cubana Flint, Nectopsyche cubana Bks., Helicopsyche – two distinct species.



Plate III. Río SABANILLA (Baracoa, Oriente), February 1973: Cubanoptila muybonita Bots., Chimarra guapa Bots., Neotrichia iridescens Flint, N. alata Flint, N. pequenita Bots., Ochrotrichia insularis ayaya Bots., Loxotrichia quelinda Bots., Oxyethira tega Flint, Smicridea cf. comma Bks., Nectopsyche cubana Bks., Helicopsyche (cubana Kings.?), Helicopsyche n. sp. related to comosa Kings.



Plate IV. Río CARPINTERO (Gran Piedra, Oriente), March 1973: Leucotrichia cf. tubifex Flint, Alisotrichia chiquitica Bots., Neotrichia iridescens Flint, Loxotrichia janella Flint, Ochrotrichia insularis ayaya Bots., Hydroptila selvatica Bots.