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The Biogeography of Somalia

Biogeographical aspects of Somalian orthopteran fauna

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SUMMARY

In this paper the Author gives an interpretation of the actual consistence and distribution of Somalian orthopteran fauna on the basis of the palaeogeographical history of the territory. Several taxa, systematically well defined and having proved limited vagility, appear to have evolved according to important geological events.

A biogeographical evaluation of the Orthopteran fauna of the Somali region has never been attempted. Because the great number of new entities or new interpretations published every year as a result of more intensive studies on this subject by several specialists all around the world, the matter is very uncertain, and conclusions very doubtful. Nevertheless, on the occasion of a congress devoted to the biogeographical history of Somalia it is important to include Orthopterans. I will try, therefore, to suggest some conclusions, by selecting taxa systematically well defined and with limited vagility.

It is commonly believed that the ancestor of Orthopterans must have been part of the Gondwanian fauna after the Cambrian period. Gondwana was an isolated entity, as were Angara, Cathays, and Euramerica (Cox, 1974), up to the Permian period (Fig. 1). The present distribution of many groups, like Eumastacoidea (Fig. 2) (Descamps, 1973), Pyrgomorphidae (Kevan, 1977), Phaneropteridae (Ragge, 1956) clearly indicate a precise Gondwanian original distribution. Spectacular exemples from the Somalian fauna are the Phaneropterid genus *Ducetia* (Fig. 3), still present in the tropical Africa, southern Asia, Indonesia, Japan, New Guinea, Solomon Isll, Australia (Ragge, 1961) and the subfamily Phlaeobinae, still distributed in the Ethiopian, Malagassian, Oriental, Austro-oriental and Australian Region (Dirsh, 1975). The specific fragmentation is, as we will see, much recent, as a result of territorial fragmentation.

In the upper Permian and Trias, Gondwana and Laurasia fused (Fig. 4) forming the Pangea (Cox, 1974). In this period, encompassing more than 100 million year, the great migrations of all principal orthopteran lines occurred. The asian triassic fossil ensiferan superfamily Hagloidea described by Go-

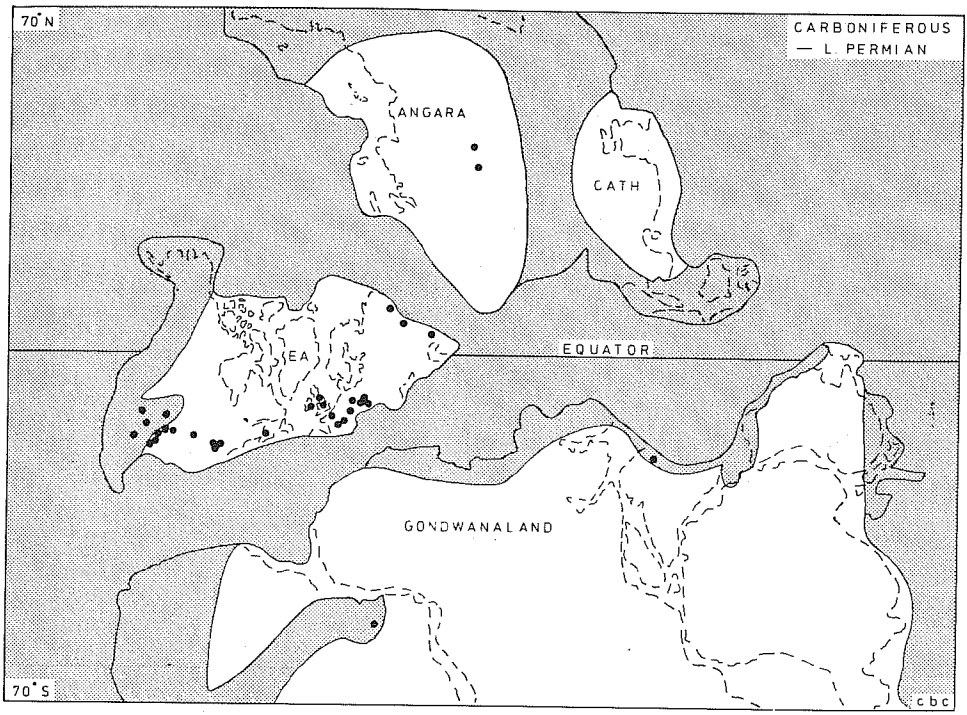

FIG. 1 - Palaeogeographic map of Carboniferous-Lower Permian (from Cox, 1974).

rochov (1986) is a good marker for the event. Modern examples are Phalangopsinae now present in the whole of America, Africa and tropical Asia (Chopard, 1968), the superfamily Eumastacoidea (Fig. 2), present in the same continents, and also in Indonesia and Australia (Descamps, 1973), Catantopidae, world wide (Dirsh, 1975) and many others. Several genera belonging to the present Somalia fauna suggest such a distribution: I wish to quote the Phaneropterid *Eurycorypha* (Tropical Africa, Arabia, Madagascar), and *Phaneroptera* (Old World south of 550 N: Ragge, 1956), the genus *Gryllotalpa*, with several species all world-wide (three of them subsequently differentiated in tropical Africa, including Somalian territory: Townsend, 1923), the Eumastacoid family Euschmidtiidae (Tropical Africa and Madagascar: Descamps, 1973), the Eyprepocnemidinae genus *Oxyaeida* (6 African and one Indian species: Baccetti, 1965c), the Romaleinae (Dirsh, 1966) plus Teratodinae complex (America, S W Asia and NE Africa), the Hemiacridinae complex, also with oriental affinity (Dirsh, 1975), and the Phleobinae *Orthochtha*, diffused in Africa and India (Dirsh, 1975). Some species could seem to have conserved this original diffusion, surviving to the subsequent territorial fragmentation. But evidently a series of continuous contacts and passive transportations must have occurred till recent time. I will quote the pantropical

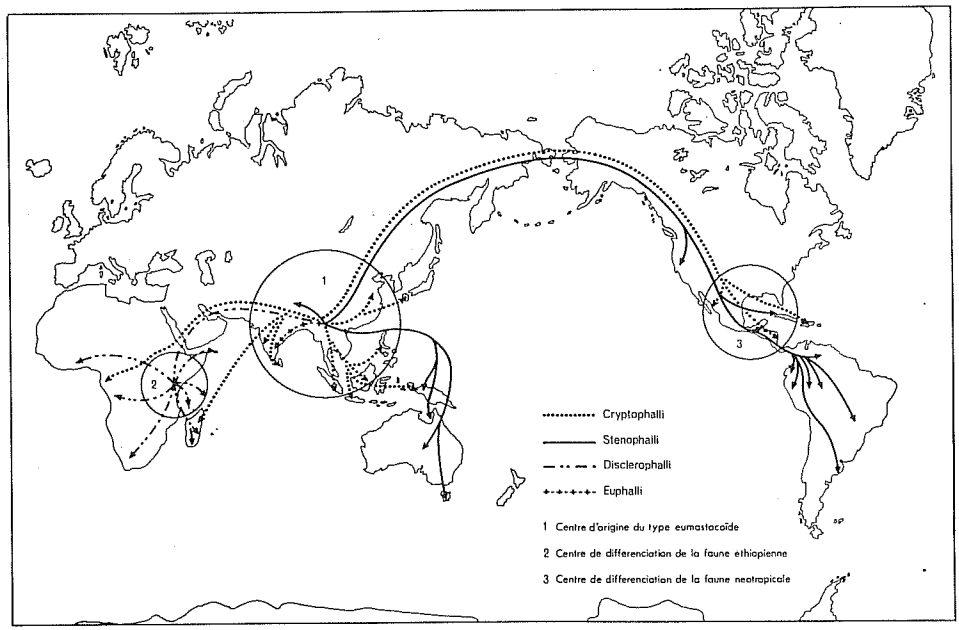

FIG. 2 - Distribution of Eumastacoidea (from Descamps, 1973).

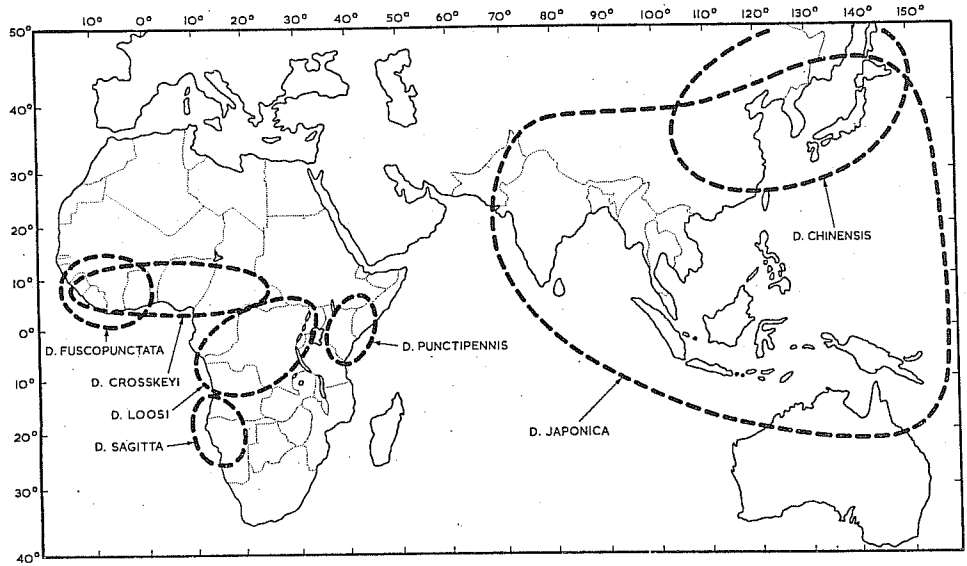

FIG. 3 - Distribution of some of the species of *Ducetia* (from Ragge, 1961).

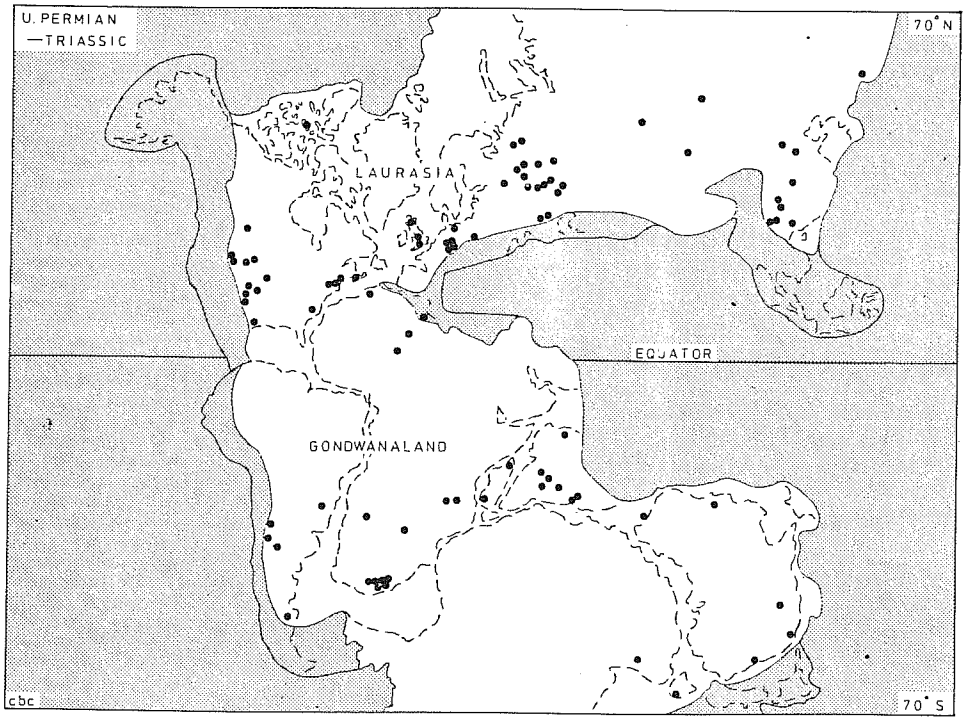

FIG. 4 - Palaeogeographic map of the Upper Permian-Trias (from Cox, 1974).

Acridid *Oxya hyla*, with its Afro-Indian Malayssian typical race (Fig. 5), extremely frequent in Somalian humid environments (Hollis, 1971), and the Pyrgomorphid *Pyrgomorpha cognata*, dispersed from Senegal to Pakistan (Kevan, 1977).

In the Jurassic period (Fig. 6) the vast territory of Pangea started to fragment, and some regions originally included in the Gondwana separated (Cox, 1974). In particular, Africa detached itself from Eurasia, and the African eastern coast became separated from Madagascar and from the tip od India. Southern Somali continued to emerge. The differentiation and present distribution of several somalian genera and species can be related to this series of events: in the Phaneropterid Gondwanian genus *Ducetia* (Ragge, 1961), fragmentation favoured speciation processes, engendering the Somalian species *punctipennis* Gerst. and *levatiala* Rge 1978. The same occurs in the other phaneropteran *Eurycorypha*, producing the Somalian species *stenophthalmica* Chopard, and many other species in tropical Africa, Arabia and Madagascar (Ragge, 1980). A further indirect demonstration is provided by the Phaneropteran genus *Trygonocorypha*, distributed in southern Asia, from Arabia to Indonesia, present in Madagascar but absent from Africa (Ragge, 1980). The phenomenon occurs in several Pyrgomorphidae, for example the

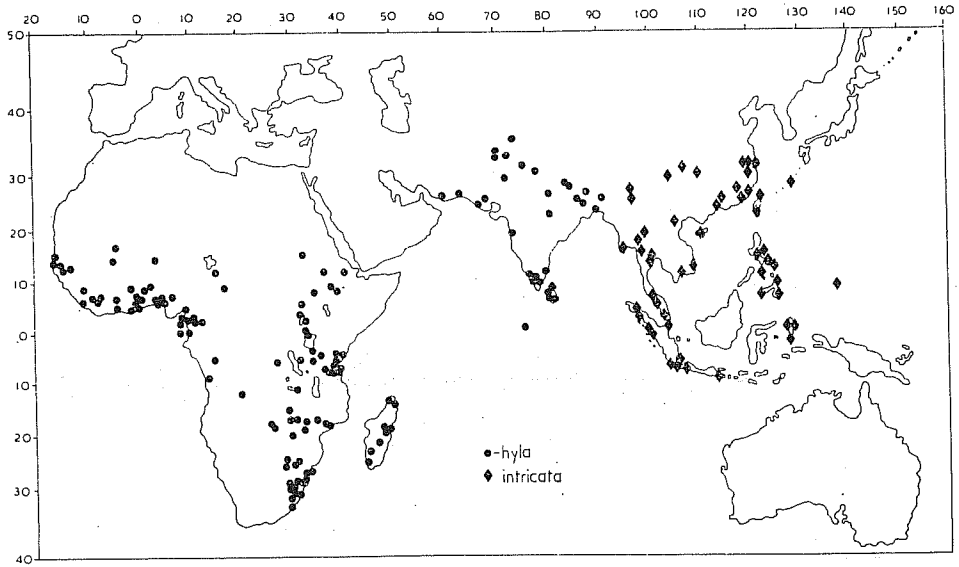

FIG. 5 - Distribution of the two subspecies of *Oxya hyla* (from Hollis, 1971).

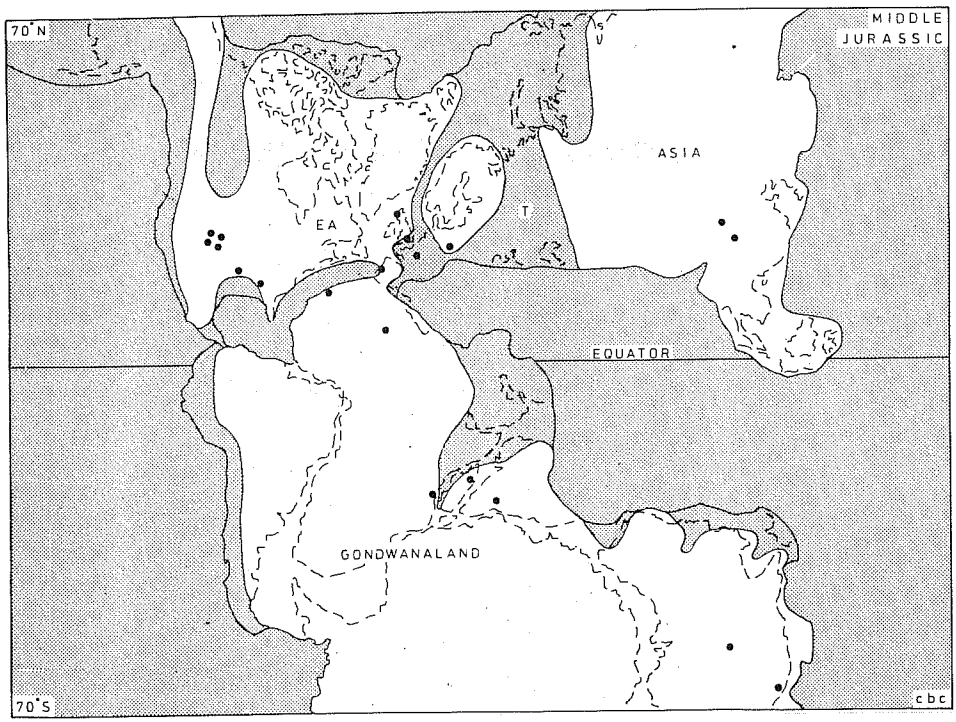

FIG. 6 - Palaeogeographic map of the Jurassic (from Cox, 1974).

Somalian peculiar monotypic genus *Megalopyrga* m., only related to the southern Indian genus *Anarchita* (Baccetti, 1985c). Strangly enough, in *Pyrgomorpha cognata* the differentiation seems to occur only to subspecific level, separating the typical subspecies diffused from Senegal to Meh, from the strictly Asian races (Hsiung and Kevan, 1975). But this differentiation may also have occurred quite recently.

In the Cretaceous (Fig. 7) period the separation of Africa from Europe, India and Madagascar was complete and northern Somalia had not yet emerged, while Arabia was still part of the eastern African coast (Cox, 1974). The origin of the African Copyphorinae *Ruspolia differens*, separated from the largely diffused Euro-Mediterranean *Ruspolia nitidula* and from the Malagassian *R. malagassa* can be referred after this period. But after the same period the differentiation of several other genera present in Somalia could also be reported. Examples could be found in the spectacular afro-arabian subfamily Hetrodinae (Ebner and Beier, 1964). Some genera of this group are east African, like *Bradyopisthius*, including in Somalia and Kenya the famous species *paradoxurus* and *Eugasteroides*, diffused in Somalia and Kenya with the peculiar species *loricatus*. But the most interesting Hetrodinae is, in this context, the genus *Anepisceptus*, distributed in Egypt, Syria, Arabia and

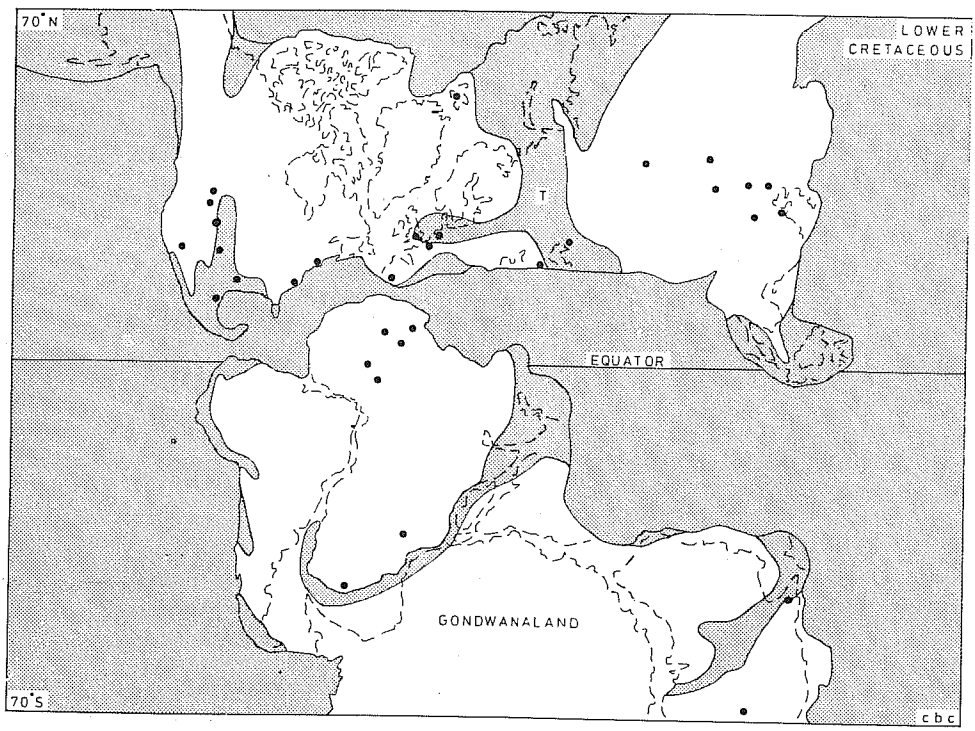

FIG. 7 - Palaeogeographic map of Lower Cretaceous (from Cox, 1974).

Eastern Africa, so restricting the origin and diffusion of the genus to periods prior to the opening of the Gulf of Aden. In this period probably the east-african Eumastacoid subfamily Apteroschmidtiinae differentiates, whose genus *Microschmidtia* has a species (*uala* Desc.) in Ethiopia, and a second one (*chelazzii* m.) in Somalia (Baccetti, 1985c), and also, even among Eumastacoidea, the peculiar family Thericleidae now (Descamps, 1977) present in Africa, Arabia and Socotra. In this family several genera are of interest in Somalia: *Plagiotryptus*, having one diffused species in Kenya, Uganda and Tanzania, five more localized in Tanzania, two in Malawi and one, *Plagiotryptus somalicus* m., recently described by me from the Somalian material collected by S. Patrizi and preserved in the Genua Nat. Hist. Museum (Baccetti, 1990a). Also the other Thericleid African genus *Lophothericles* Desc. has four Somalian species, while the genus *Urrutia* seems to be purely Somalian with the species *somalica* Rme (Italian Somalia) and *mijurtinia* m., which we will discuss later.

In the Eocene period an eastward marine regression occurred and the northern Somalia emerged (Merla et al., 1973). Evidently after this time the latter area became populated, and we see, in fact, that strictly related species of genera present in the northern and in the southern somalian territory. I can quote, among Eumastacoidea, *Urrutia* Rme, which we have seen represented by one species in the formerly Italian Somalia (*U. somalica* Rme) and by another species, *U. mijurtinia*, recently described by me, in northern Somalia (Baccetti, 1990a). There is stronger evidence also for the other Eumastacoid genus *Apteroschmidtia*, known only from the northern territory (Descamps, 1973), which must be dated after this period, if its absence from southern Somalia is confirmed. The same must be supposed for the Pyrgomorphids *Parorthacris* and *Vittisphena*, the Romaleinae *Eurynotacris* and the Acridinae *Guichardippus* and *Somalella*, all monotypic genera only found in British Somaliland (Dirsh, 1965). Other interesting observations are provided by species belonging to genera more widely distributed in Somalia. The Pyrgomorphid *Somalopyrgus* differentiates in British Somaliland a species (*rotundipennis* Kevan) discrete from the southern *S. messanai* m. (Baccetti, 1985c); the Romaleinae *Robecchia*, which has the typical species *obesa* Schult. near Obbia, and another new species, *bicolor* m., in the Ogaden, has a different species in British Somaliland: *granulosa* Uvarov, which I have found in material collected by Scortecci in Mijurtein (Baccetti, 1990b). Moreover, this material contains a fourth new species, *R. gibba* m. The same is true for the Euryphiminae *Surudia* and *Somaliacris*. The second is a monotypic, northern Somalian genus (Dirsh, 1965); the first is fragmented into three species, *aptera* Kevan, *loboptera* Uv. and *somalica* Dirsh, all close to the African Horn (Dirsh, 1965). The large east African Catantopinae genus *Sauracris* belongs to the some category having the highest number of species in British Somaliland (Popov, 1959) and one, *S. simonettae* Ritchie, described in Benadir. I will also mention the Hemiacridinae *Xenippella*, fragmented in two species: *benadiria* m. in Benadir, and *somalica* Kevan, in British Somaliland (Baccetti,

1984b). Finally the African Oedipodinae genus *Wernerella* Johnsen, with the Somalian species *somalica* Johns. fragmented in two races: one northern and second, *meridionalis* m., in southern Somalia (Baccetti, 1985c). Other species invaded British Somalia recently without differentiating from the original stock: I will mention, among them, *Paraphymateus roffeji* Dirsh, gigantic meiopterous Pyrgomorphidae found several times in Italian Somalia and once in British Somalia (Baccetti, 1985c).

In the Oligocene period (Azzaroli, 1958) the Gulf of Aden was formed, and the connection between Somalian and Arabian faunas were lost (Azzaroli, 1958; Merla et al., 1979). One classic example of a species formed after that time is the monstruous apterous Hetrodid Ensiferan *Anepisceptus longespinosus* Chopard et Bacc., known only from Italian Somalia (Chopard and Baccetti, 1968), while other species of the genus are present also in Arabia. The origin of the fragmentation and differentiation occurred in many Somalian genera absent from Arabia, may have occurred after this period, sometimes quite recently and mostly due to ecological factors. I will quote among Ensiferans the eastern African Phaneropterine genus *Tropidonotacris*, present in Italian Somalia with the species *carinata* Chop. (Ragge, 1980), the Ethiopian monotypic genus *Prosphaga* Ragge (Ragge, 1960), with the species *splendens* Rge, that is present in Somalia, the genus *Horatosphaga*, with the Somalian species *H. heteromorpha* Karsh. Among the Acrididae Romaleinae, after this period can be assigned the differentiation of the very peculiar eastern African genus *Acrostegastes*, now under revision by M. Ritchie, having many species in Kenya and coastal Somalia; among Acridinae, the differentiation of *Laeva*, a pure tropical African genus, having a Somalian species, *nicholai* m. (Baccetti 1985c), of *Leopardia* m., a genus only present in Benadir territory (Baccetti, 1985a), of *Elmisia*, a monotypic Somalian genus with the species *camelina* Dirsh (Baccetti, 1962). Among Euryphyminae the differentiation of the Somalian genus *Acoryphella*, with the three species *zonata* G. Tos, *agilis* m. and *robusta* m., all living in the Benadir area (1984a). Finally among Catantopinae there are some peculiar east African genera present in Somalia which must be mentioned: *Oxyaeida*, having many species in tropical Africa, two of them, *pultoni* Rme and *macroptera* m., in Somalia (Baccetti, 1985c), *Ischnansis*, with the two Somalian species *gracilis* Schult. and *serenae* m., found in the Bagiuni islands (Baccetti, 1984b), the minute *Merehana*, having probably two species in the territory: *garrhei* Kevan in the inner region and *somalica* Ritchie more coastal (Ritchie, 1982). Moreover the micropterous genus *Platycatantops* m. should be mentioned, having been described from Afgoi (Baccetti, 1985c). A direct consequence of the opening of the Gulf of Aden seems to be the fragmentation of *Sauracris parvula* (Popov, 1959) in two races (*parvula parvula*, from Somalia, and *parvula arabica*), evidently occurred in recent time. The differentiation (claimed by Johnsen and Schmidt, 1982), of *Heteracris rantae* into two races (one Arabic, one Somalian) is excluded by Grunshaw (pers. comm.). In fact this species is too vagile to be considered in a biogeographical discussion. Moreover the differentiation of

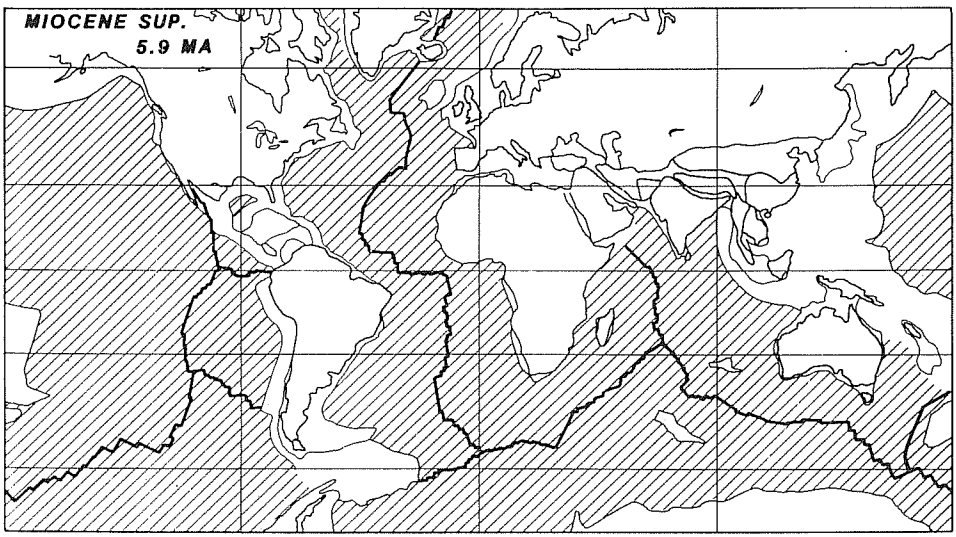

FIG. 8 - Palaeogeographic map of the Upper Miocene (from Scotese et al., 1988).

Heteracris, as that of the African species of *Anacridium* (La Greca, 1970), may be mostly due to ecological factors.

In the Miocene (Azzaroli, 1958) period the marine regression was more evident, the Mediterranean sea suffered the Messinian crisis, ample connections between Eurasia and Africa occurred, the Sahara region was covered by humid forests. The introduction into Africa of many European orthopterans, most of them spreading to Somalia was evidently due to this period. For other species of similar distribution the reverse route can be suggested, and some cases are uncertain. The mostly European genus *Ephippiger* certainly followed a north-south migration, reaching Somalia, whilst the opposite is probably true for *Conocephalus conocephalus, Gryllus bimaculatus, Eyprepocnemis plorans*, all species with extensive African ranges, including Somalia (Baccetti and Abukar, 1987), and more or less largely extended to the Mediterranean region. Also *Paracinema tricolor, Acrida turrita*, quite common in Somalia (Baccetti and Abukar, 1987), can be probably referred to the same group, belonging to genera having relatives and many species differentiated in Africa, but possibly also of Mediterranean origin (La Greca, 1970). These species, and many others, are present in Somalia in a tropical African race, while the Mediterranean region has a different one. This is probably due to an important event which occurred in the subsequent period.

During the Pliocene, in fact, an imponent anathermic phenomenon, the desertification of Sahara (Quezel, 1978; R.C.M.N.S., 1984) occurred. Many widespread genera and species were separated in two territories: for example the Phaneropterine species *Phaneroptera sparsa*, now limited to Spain, Morocco and Africa south of Lat. 15° N. (Ragge, 1980). To this time we wan ascribe the diffusion of many deserticulous genera, even if too much vagile

for zoogeographical indications, as Acrotylus, Sphingonotus, Oedaleus and other Oedipodinae, and their differentiation, continued also in the subsequent period, under ecological pressure (Ritchie, 1981). Probably also *Pheophilacris*, envolved from the members of Phalangopsini tribe isolated in Africa during the Creataceous time, was spreading at this period. But a more spectacular event of this phenomenon was the restriction to Somalia of the only known African *Ephippiger, E. tropicalis* m., belonging to a genus that was widespread in the Miocene period from Europe to Africa, but subsequently restricted, with many species, mostly in south Europe, and which disappeared from the whole Africa, but subsequently restricted, with many species, mostly in south Europe, and which disappeared from the whole Africa except Somalia, where a peculiar specie arose (Baccetti, 1985b). Evidently the most vagile species did not lose contact between different populations during Pliocene and Pleistocene, and no further examples of speciation occurred. One only case seems clear to me: the troglophilous race of *Pheophilacris townsendi, spelea* m., isolated and differentiated in a system of caves close to Bardera (Baccetti, 1985d).

This rapid sketch is unable to totally clarify the history of Orthopteran evolution in Somalia, mostly because the systematics of several important genera still awaits clarification. But the problem appears interesting, and we have no doubt that the near future will throw light on the many obscure points that today seem insoluble.

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