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Salticidae (Arachnida: Araneae) of New Guinea - a zoogeographic account

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RIASSUNTO

Malgrado la loro comune storia geologica, le connessioni territoriali del passato, l'azione antropica e la vicinanza geografica, l'Australia e la Nuova Guinea hanno una fauna di Salticidi molto differente. Il numero di generi presenti in Nuova Guinea è circa uguale a quello noto per l'Australia (50 e 58 rispettivamente), malgrado la diversa supeficie delle due regioni. Per la Nuova Guinea sono stati finora descritti quindici generi endemici. Almeno sei generi sono immigrati dalle regioni tropicali del Vecchio Mondo, alcuni altri sono ad ampia distribuzione o cosmopoliti; ciò sembra il risultato della dispersione espansiva post-Miocenica.

Parole chiave: Salticidae, Nuova Guinea, Generi endemici, Zoogeografia.

SUMMARY

Despite common geological history, past land bridges, human agency and today's geographical closeness, New Guinea and Australia have surprisingly different salticid faunas. In spite of much smaller area the number of recorded genera in New Guinea is almost as large as in Australia (50 and 58 respectively). The endemics are represented by fifteen described genera. At least 6 genera are Old World tropical immigrants, some others have wide or cosmopolitan distribution - both seem the result of the post-Miocene expansion or dispersion.

Key words: Salticidae, New Guinea, Endemic genera, Zoogeography.

General background

New Guinea is one of most attractive model areas for the zoogeographic research. The island is the second largest one in the world. It forms a link in a chain of archipelagoes stretching from Malayan Peninsula to the middle Pacific. As a part of the Australian tectonic plate New Guinea was separated from the Gondwanan supercontinent (at that

stage being represented by the Antarctic plate only) some 45-50 million years ago. In the mid-Miocene (15 m.y. B.C.) the Australian plate collided with the Sunda Island arc system, creating a temporary land connection from SE Asia to Australia, the only one in post-Gondwanan period (FILEWOOD, 1984). The continued northward movement produced a disjunction from the Sundaland plate and an ocean barrier. During most of the geological history New Guinea and Australia formed one common land. The present seaway of the Torres Strait was established in the Pleistocene, some 6500-8000 years ago. Thus, the whole area is derived from the complex interactions between parts of the Australian plate and the Pacific and the Sunda arc system (BARLOW, 1981), resulting in an exchange of faunistic and floristic elements in both directions with different intensity.

New Guinea offers a wide range of climates, habitats and great topographic variability. High mountain ranges and isolated valleys of the tropics and subtropics have the richest faunas and floras and are known to be the areas of the most intense speciation rate (MARTENS, 1979; PRÓSZYNSKI, 1980). At sea level the flora of New Guinea is similar to that of the Sunda Archipelago (BARLOW, 1981) but southwestern Papua is usually incorporated into Australian floristic region because of resemblances of the open savannahs to that of N Australia. The floristic affinities of New Guinea and Australia also depend on altitudes, being more distinctive at higher levels (*Nothofagus*, *Araucaria*, some species of Proteaceae and *Myrtaceae*) and illustrating Gondwanan heritage.

Plate tectonics and Salticidae

The influence of plate tectonics on distribution are related to the age and dispersibility of the analysed taxa (BERLAND, 1934; LEGENDRE, 1979; LEHTINEN, 1980; FILEWOOD, 1984; BRIGGS, 1987; NIEDBALA, 1991). Salticidae are rather poor candidates for dispersion (HORNER, 1975; SALMON & HORNER, 1977; ZABKA, 1990). From the region only a few species, being the canopy inhabitants, are suspected to have relatively high dispersibility (ballooning?) (ZABKA, 1991), few others, having pantropical or transpacific distribution, are likely to by dispersed by human activity. Almost all modern salticid genera appeared in post-Oligocene period (WUNDERLICH, 1986; WOLFF, 1990; ZABKA, 1988) and, in contrast to some other faunistic groups (MAIN, 1981a-b; 1982, FILEWOOD, 1984), the Gondwanan elements should not be expected in

southern continents. The taxonomic research (see ZABKA, 1991) support this hypothesis. It can not be said, however, that the break up of Gondwana did not affect today's salticids. It was the separation of the large land masses and its consequences that resulted in great climatic and floristic dissimilarity and influenced the spider fauna. Salticidae of Australia are the best example; the domination of *Eucalyptus* formations provides unique conditions for evolution of highly endemic fauna (ZABKA, 1991). Common genera and species in southern continents are not the result of geological past but were established more recently in natural expansion and human activity.

The Miocene collision of the Australian and Sunda plates brought together two rich faunas and New Guinea has become the most active zone of faunistic exchange in latitudinal direction, in contrast to limited North-South exchange. The dry habitats of the Torres Strait and Southern Papua and the extinction of tropical rain forests in large parts of NE Australia produced a very effective ecological barrier for tropical rain forest dwellers in their expansion towards Australia. In the opposite direction, the rain forests of New Guinea created a barrier for the endemic, dry adapted Australian salticids in their expansion towards the inland New Guinea and SE Asia.

Zoogeographic elements

The salticid fauna of New Guinea consists of over 50 described genera (PRÓSZYNSKI, 1990; ZABKA, unpubl.), most of them with a large number of species. Depending on distributional patterns, few zoogeographic groups can be separated.

1. Wide spread genera: *Myrmarachne*, *Afraflacilla*, *Bianor*, *Frigga*, *Harmochirus*, *Hasarius*, Menemerus, *Plexippus*, *Portia*, *Thyene* and *Telamonia*. Except for *Myrmarachne*, the other genera are represented by few species. Some of them known to have cosmopolitan/pantropical representatives (*Frigga*, *Hasarius*, *Plexippus*) that have spread to New Guinea due to human migrations. Judging from the present zoogeographic and biological data, it seems likely that some genera may have originated in SE Asia and tropical Africa and expanded eastwards, except for *Frigga* being of South American origin.

2. Indo-pacific genera: *Bavia*, *Charippus*, *Cosmophasis* (?), *Cytaea*, *Palpelius*, *Plotius*, *Zenodorus* (and related undescribed genera). They range from India to the western Pacific islands and the northern Austra-

lia, occurring mostly in tropical forests or secondary habitats. Their wide distribution seems partly a result of floristic affinities and expansion - starting from the Miocene plate collision. Judging from the species diversity, some genera (*Cytaea*, *Zenodorus*) may be of New Guinean origin. The occurrence of Cosmophasis outside the Indo-Pacific area has to be verified since there is a possibility of convergence.

3. Papuan genera: *Allococalodes*, *Aruana*, *Bathippus*, *Cocalodes*, *Coccorchestes*, *Diolenius*, *Euryattus*, *Furculattus*, *Hyctiota*, *Leptathamas*, *Omoedus*, *Paraharmochirus*, *Poecillorchestes*, *Porius*, *Thorelliola*, *Udvardya*. Some are represented by a great number of species (e. g. *Coccorchestes*) and seem to originate in the rain forests of New Guinea. They usually have few outside New Guinean representatives, from the Sunda Archipelago to the middle Pacific, as a result of the post-Miocene expansion. The Australian ranges seem to be the remnants of former wider distribution that included tropical NE Queensland and have been reduced because of rain forest extinction.

4. Australian immigrants: *Arasia*, *Helpis*, *Holoplatys*, *Ligonipes*, *Opisthoncus*, *Sandalodes*, *Servaea*, *Simaetha*, *Simaethula*, *Sondra*. Most genera inhabit *Eucalyptus* formations in the Port Moresby area. Some representatives of *Holoplatys* and *Sondra* can also be found under *Araucaria* bark or in rain forest leaf litter, respectively. Of all the common genera some are widespread and cosmopolitan and should not be considered as a measure of affinities. Amongst over 30 genera being of the Australian origin, only 10 are represented in New Guinea (ZABKA, 1991). At the species level the percentage is even lower.

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