

**Abstracts of Conference Papers Published in the  
Biological Journal of the Linnean Society**

**BERRY, R.J.** 1992, The significance of island biotas. *Biological Journal of the Linnean Society*, 46: 3-12. With one figure.

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Island biotas have played a significant part in evolutionary biology, because they are so often starkly different from continental biotas (even though it took Darwin some time to realize this; his visit to the Galapagos Islands was not the converting experience often claimed for it). In recent years, most interest has concentrated on species diversity on islands, but differentiation of endemics is probably worth more attention. Key factors in the evolution of island forms include the complementary processes of Mayr's 'genetic revolution' (a genetic bottleneck, particularly when a previously empty area is colonized; and adaptation in isolation), the opportunistic (not perfecting) nature of natural selection, and the ecological history of island colonists.

**KEY WORDS:**- Evolution - islands - natural selection - Galapagos - Hawaii - house mice - founder effect.

**Maria Da Luz MATHIAS and Antonio MIRA**, 1992. On the Origin and colonization of house mice in the Madeira Islands. *Biological Journal of the Linnean Society*, 46: 13-24. With 3 figures.

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The skulls and skins of adult house mice from the Madeira Islands have been studied and compared with those from the Salvage Islands and with material from the neighbouring Portuguese mainland man-associated and wild forms, respectively *Mus musculus domesticus* Ruddy, 1772 and *M. spretus* Lataste, 1883. Differences between island and mainland populations were found in some of the analysed features. Insular skins of mice were found to be smaller than those of specimens from the mainland. However, in Madeiran and Salvage mice toothrows were much more developed than in the mainland house mice. It is considered that the causes of these differences lie in the different characteristics of the habitats, mainly food availability, and also in the isolation of populations. *Mus musculus domesticus* appears to be the only form of the house mouse to have so far successfully colonized the Madeiras.

**KEY WORDS:**- House mouse - morphometric differentiation - origin - island.

**LOPEZ-JURADO, L.F. and MATEO, J.A.** 1992, Two models of evolution in Canarian lizards based on the use of spatial resources. *Biological Journal of the Linnean Society*, 46: 25-37. With 5 figures.

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The morphological and genetic differences between populations of Canarian lizards on four islands were analysed in relation to two ecological systems: the laurisilva forest and the young volcanic ecosystems or 'malpaisés'. The two ecosystems induce two difference evolutionary responses by lizard populations; morphological and genetic modifications are intense in the case of a very old ecosystem like laurisilva whereas in the young volcanic ecosystems, morphological modifications are much more pronounced although the temporary nature of the ecosystem is limiting from point of view of speciation.

KEY WORDS:- Evolution - Canary Islands - lizards - laurisilva forest - young volcanic ecosystems - speciation - ecology

**MATEO, J.A. and LOPEZ-JURADO, L.F.** 1992. Study of dentition in lizards from Gran Canaria Island (Canary Islands) and its ecological and evolutionary significance. *Biological Journal of the Linnean Society*, 46: 39-48. With 6 figures.

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The dentition of *Gallotia stehlini* from one extant and two subfossil populations dated as 4000 and 2000 years before present was studied. Body measurements were similar in the two subfossil populations, but much greater than the largest sizes observed today in *G. stehlini*. The morphology of the dental cusps in this *G.stehlini* differs greatly from that of other Lacertidae, including other congeneric Canarian species; this has been connected with a vegetarian diet. A decrease in heterodonty with size of the animal is also seen which contrasts strongly with the models observed in the Mediterranean lacertid lizards.

KEY WORDS:- Dentition - lizards - Canary Islands - ecology - evolution.

**Rainer HUTTERER, Tiziano MADDALENA and Obdulia M. MOLINA, 1992.** Origin and evolution of the endemic Canary Island shrews (Mammalia: Soricidae), *Biological Journal of the Linnean Society*, 46: 49-58. With 3 figures.

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Until recently the North Atlantic Islands were believed to house only mammals introduced by humans. Recent work has demonstrated that at least the Canary Islands house(d) a native mammal fauna. New data including chromosome numbers, genetic distances and analysis of vocalizations are given for the two extant shrew species, *Crocidura canariensis* and *C. osorio*, and their possible sister taxa are evaluated. Evidence is presented for the hypothesis that the two island species originated from two different lineages of the Palearctic branch of the genus *Crocidura*. The data support the present status of the Canary Island shrews as local endemics of high conservation priority.

KEY WORDS: - Canary Islands - shrews - island evolution - conservation.

**SHREEVE, T.G. and SMITH, A.G. 1992.** The role of weather-related habitat use on the impact of the European speckled wood *Pararge aegeria* on the endemic *Pararge xiphia* on the island of Madeira. *Biological Journal of the Linnean Society*, 46: 59-75. With 2 figures.

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Habitat use and microclimatic constraints on the activity of the endemic Madeiran speckled wood butterfly and European speckled wood were studied in September 1989 and April 1990. The endemic species is the most closely associated with laurel forest and the recently established European speckled wood with pine and eucalyptus forest. The relative abundances of the two species in different sites changes with season, with the endemic species being relatively more common in low level sites in April at the end of the cool season, than in September at the end of the warm summer period. It is suggested that changes of abundance in different locations are related to the thermal biology of the two species. The endemic speckled wood is active at lower air temperature than the European species, and the cool winter period may facilitate occupation of open sunny sites. The activity of the endemic speckled wood is less constrained by cool and dull conditions than is that of the European species, which requires higher temperatures for activity. It is proposed that the activity and behavioral repertoire of the endemic is most suited to climatic conditions in, and structural

features of, laurel forest. The European species is most suited for activity in open woodland and agricultural habitats. Interactions between adults of the two species do not indicate direct competition. Changes in the distribution of the two species can be linked to probate changes of habitat on the island of Madeira.

KEY WORDS:- Lepidoptera - Satyrinae - habitat use - microclimate - thermoregulation - behaviour - colonization - establishment.

**JONES, Martin J. and LACE, Lesley A.** 1992. The speckled wood butterflies *Pararge xiphia* and *P. aegeria* (Satyridae) on Madeira: distribution, territorial behaviour and possible competition. *Biological Journal of the Linnean Society*, 46: 77-89. With 3 figures.

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Madeira is home to two species of speckled wood butterfly. *Pararge xiphia* is endemic and is common at mid to high altitudes, within and around the edges of the indigenous laurel forest. In 1976 *P.aegeria* colonized the island and anecdotal reports suggest that it may have been responsible for the loss of *P.xiphia* from some of its former haunts. The aims of this paper were (1) to provide comprehensive data on the distribution, habitat preferences and recent changes of range of the two species and (2) to examine territorial behaviour to see if inter-specific competition is taking place. Census results show that there are basic differences between the species in altitudinal range and habitat, but they are found together at high densities at habitat boundaries. Repetition of some of the census routes after a 4-year gap suggests that *P.aegeria* is expanding its range into the areas dominated by *P.xiphia*. Behavioral data demonstrate that the males may be competing by causing each other to expend more energy in defence of territories. Although competition may be present, it is not yet possible to establish which species is more affected and how competition may have contributed to the recent changes in the species' ranges.

KEY WORDS:- Interspecific competition - *Pararge xiphia* - *P.aegeria* - Madeira - territorial behaviour.

**CRONK, Q.C.B.** 1992. Relict floras of Atlantic islands: patterns assessed. *Biological Journal of the Linnean Society*, 46: 91-103.

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St Helena (South Atlantic Ocean) and Macaronesia have endemic plants that have been interpreted as relicts. This paper divides these relicts into three main types. It is suggested that type 1 relicts are of Miocene age. They are usually wet tropical forest trees,

geographically and taxonomically highly disjunct from their nearest relatives. Type 2 relicts are of Late Miocene or Pliocene age, usually trees of tropical or subtropical seasonally dry vegetation, often with trans-African disjunction, and moderate taxonomic isolation. Type 3 relicts are of Late Pliocene or Pleistocene age, usually herbs of arid zone or temperate vegetation, with little taxonomic or geographical disjunction from their nearest relatives. Relict theory is defined, with discussion of its explanatory power to account for patterns of endemism, and more generally, taxonomic and geographical patterns of biodiversity.

KEY WORDS:- Endemic plants - relicts - palaeoendemics - oceanic islands - relict theory - biodiversity.

**CAMERON, R.A.D. and COOK, L.M.** 1992. The development of diversity in the land snail fauna of the Madeiran archipelago. *Biological Journal of the Linnean Society*, 46: 105-114. With 1 figure.

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The diversity and distribution of the Madeiran land snail fauna is analysed in relation to the geological and environmental history of the archipelago. High levels of single-island endemism, the varying balance of families and genera between islands and the local differentiation of populations within islands all suggest that speciation has been predominantly a within island phenomenon. Restricted patterns of distribution, nevertheless, suggest that speciation is predominantly allopatric and that it is driven by repeated and sometimes devastating environmental changes. An equilibrium model of faunal diversity is rejected; the fauna is supersaturated at archipelago level, yet individual sites are not species rich, nor are all niches full. The consequences for the success and effects of invasions and introductions are discussed, and questions still to be answered raised, in particular about the timing of colonization events and their number, and about the great range of rates of radiation apparently achieved by different stocks.

KEY WORDS:- Land snails - diversity - Madeira - endemism.

**LACE, Lesley A.** 1992. Variation in the genitalia of the land snail *Heterostoma paupercula* (Lowe, 1831) (Helicidae) in Madeira. *Biological Journal of the Linnean Society*, 46: 115-129.

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The small helioid snail *Heterostoma paupercula* occurs in the Azores and Madeiran. Previously regarded as a single species, it was split into two genera on the basis of variation in shell morphology and genital anatomy: *Heterostoma* having a toothed shell and being

hemiphallic, while *Steenbergia* had a toothless shell and was euphallic. This division was first questioned when toothed shells (*Heterostoma*) in the Azores were found not to be hemiphallic. In this study the genitalia of 361 specimens from islands in the Madeira archipelago were examined. Four components of the genitalia were measured (penis/epiphallus, flagellum, bursa stalk and bursa) for 158 individuals. Hemiphally was found to be rare, occurring in only a proportion of the populations at two localities and it did not correspond with the expected shell morphology - the shells were untoothed (- *Steenbergia*), which is the opposite of that previously described.

Variation in the genitalia was geographically based: Madeira and its nearest neighbour islands forming one group and the Porto Santo islands another. There is no evidence to suggest that the hemiphallic animals are more than an intraspecific form. It is suggested that the variation between the two island groups is reflective of allopatric differentiation. Without further evidence of divergence, *H.paupercula* should be regarded as the sole species throughout the range and the genus *Steenbergia* should be suppressed.

KEY WORDS:- Hemiphally - *Heterostoma paupercula* - Madeira - variation - speciation.

**BACKELJAU Thierry, DE BRITO Carlos P., DA CUNHA Regina M. Tristao, MARTINS Antonio M. Frias and DE BRUYN Luc. 1992.** Colour polymorphism and genetic strains in *Arion intermedius* from Flores, Azores (Mollusca: Pulmonata). *Biological Journal of the Linnean Society*, 46: 131-143. With 3 figures.

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Thirty specimens of *Arion intermedius* from Flores (and Corvo) were electrophoretically (PAGE) assayed for 11 enzymes, yielding information about 14 putative loci in two colour morphs of this species. One of these colour variants was tentatively identified as *A.pascalianus* (P. morph). Except for the Mdh locus, all loci in *A. intermedius sensu lato* from Flores were monomorphic. Mdh, however, was diallelic for Mdh100 and Mdh122. This latter electromorph was absent in *A.intermedius sensu stricto* from Flores, but present in the P. morph and *A.intermedius* from Belgium. As a consequence *A.intermedius sensu lato* from Flores consists of two genetic strains defined by the Mdh alleles. The genetic identity between these strains (I) is 0.929. The genetic identity between the P morph and *A.intermedius sensu stricto* in Flores is 0.951, while between the P morph and Belgian *A. intermedius* it is 0.973. These values suggest that the supposed *A.pascalianus* from Flores is only a colour morph of *A.intermedius*. This paper also provides the first published record of this species from the island of Corvo.

KEY WORDS:- Allozymes - *Arion intermedius* - *Arion pascalianus* - Azores - electrophoresis - polymorphism - population genetics - systematics.

**DE BRITO, Carlos Pereira**, 1992. Electrophoretic results of a biochemical systematic survey of *Oxychilus (Drouetia) atlanticus* and some other Zonitidae (Gastropoda: Zonitidae). *Biological Journal of the Linnean Society*, 46: 145-151. With 4 figures.

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*Oxychilus (Drouetia)* is an endemic terrestrial mollusc from the Azores that shows a high degree of both anatomical and morphological variability. In order to support a biochemical systematic study, several potential taxonomic isoenzymes were tested over non-congeneric, congeneric, consubgeneric and infraspecific taxa.

KEY WORDS:- Gastropoda - Zonitidae - *Oxychilus* - *Drouetia* - biochemical systematics - Azores.

**ENGHOFF, Henrik**, 1992. Macaronesian millipedes (Diplopoda) with emphasis on endemic species swarms on Madeira and the Canary Islands. *Biological Journal of the Linnean Society*, 46: 153-161.

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Endemic species swarms constitute large fractions of the millipede faunas of Madeira (29 species of the *Cylindroiulus madeirae* group, plus six species of *Acipes*, out of a total of 60 species) and the Canary Islands (46 species of *Dolichoïulus*, plus four species of the *Glomeris alluaudi*-group, out of a total of about 79 species). The poorer faunas of the Azores (22 species) and the Cape Verde Islands (15 species) in contrast only include a few endemics. The *Cylindroiulus madeirae* group and *Dolichoïulus* show a high degree of diversity of structure (size, colour, leg length etc.) and habitat (laurisilva, xeric habitats, caves). The *C. madeirae* group, unlike *Dolichoïulus*, is strongly concentrated in the laurisilva. In this habitat, microhabitat differentiation is pronounced in both swarms.

KEY WORDS:- Millipedes - Diplopoda - Macaronesia - Azores - Madeira - Canary Islands - Cape Verde Islands - species swarms - adaptive radiation.

**NETO, Anna Isabel**, 1992. Contribution to the taxonomy and ecology of the Azorean benthic marine algae. *Biological Journal of the Linnean Society*, 46: 163-176. With 12 figures.

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Algal zonation patterns were studied in two sites (Caloura, south coast and Ribeirinha, north coast) of the island of Sao Miguel, Azores. AT each site two stations were studied and the transects revealed the occurrence of two distinct and well established algal zones. In the first zone, daily immersed and emersed by the tide, the algae were growing in a dense and short tangle forming a mat, referred to as algal turf. In the second zone, which was wet most of the time, the algae were large and frondose. A list of the species of benthic marine algae occurring on the algal turf of each station is given. Of the total of 47 species found, eight are new for the Azores and another 13 species are recorded for the first time for Sao Miguel. *Gigartina acicularis* (Roth) Lamouroux and articulate coralline algae (*Corallina officinalis* Linnaeus and *Jania* spp.) were the more common species. Seasonal variation of the algal turf was studied and related to mean monthly values of air and sea water temperatures, insolation and hours of light. The zonation patterns and composition of algal species were compared with those from other open rocky shores.

KEY WORDS:- Azores - zonation - intertidal zone - algal turf - benthic marine algae.

**AZEVEDO, Jose Manuel N.** 1992. Algae-associated marine molluscs in the Azores. *Biological Journal of the Linnean Society*, 46: 177-187. With 4 figures.

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The molluscan fauna of a special habitat, the high intertidal algal turf, was studied at four stations on the island of Sao Miguel, Azores. The number of species found ranged from 13 to 23. However, a small group of only six species (the bivalve *Lasaea adansonii* and *Alvania postrema*) accounted for more than 80% of all the specimens collected. Mollusc density reached values of 20,000 specimens per 100 g algal dry weight. The abundance and number of species of molluscs was comparable with those reported for algal zones lower on the Azorean shores.

Wave exposure and seasonality effects were found to be small, presumably because of the relatively mild abiotic conditions and the protective role of the turf. The algal substrata influenced the phytal molluscan community in two ways. First, the abundance of molluscs was significantly correlated with algal dry weight. Secondly, molluscan abundance and diversity were influenced by the algal composition of the turf. A rich algal composition, with several species of branched fleshy and coralline algae, was associated with a rich molluscan fauna. The dominance of coralline algae resulted in an abundant but species-poor fauna, while an almost monospecific turf of *Gigartina* was poor in both species and number of molluscan fauna.

KEY WORDS:- Marine molluscs - phytal communities - species diversity - intertidal zone - Azores.



**GREEN, J.** 1992. Island biogeography, diversity and dominance of zooplankton in crater lakes on the Azores. *Biological Journal of the Linnean Society*, 46: 189-205. With 7 figures.

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In July and August 1988 samples of zooplankton were collected from 17 lakes on four islands. Five species of Cladocera, three species of Copepoda and 30 species of Rotifera were found. The maximum numbers of species in any one lake were four planktonic Cladocera, two Copepoda and seven planktonic Rotifera (with up to six additional non-planktonic species). The smallest, most distant island had fewer species than the largest island nearest to the mainland, but the number of species in each lake was determined more by the size of the lake than by its location. This results in the most distant island having lakes containing the same number of species as lakes of similar size on islands nearer to the mainland. The numbers of zooplankton species in each of these lakes are significantly lower than the world average, and the dominance ratios are significantly higher.

KEY WORDS:- Islands - crater lakes - zooplankton - diversity - dominance.

**ASHMOLE N. Philip, OROMI Pedro, ASHMOLE Myrtle J., MARTIN Jose L.** 1992. Primary faunal succession in volcanic terrain: lava and cave studies on the Canary Islands. *Biological Journal of the Linnean Society*, 46: 207-234. With 5 figures.

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Invertebrate communities in volcanic habitats of different ages on the islands of La Palma and El Hierro were studied using standardized trapping and searching techniques. A variety of graphical and numerical approaches were used to analyse relationships among the sites. Young, barren lava flows constitute aeolian ecosystems with a fauna of generalized detritivores and predators, especially collembolans, earwigs, thysanurans and crickets. Surface samples have many individuals and low diversity; those from caves have smaller numbers but similar taxonomic composition.

Vegetated surface habitats have richer communities, with diverse herbivores and predators but largely without the pioneer 'lavicolous' species. Caves with high humidity and stable temperature contain mainly specialized troglobitic species, but if there are both dry and humid sections lavicoles may also be present. Divergence into distinct epigeal and hypogean communities results from both abiotic and biotic processes, including erosion and plant succession. While these occur mainly on the surface they also affect caves, increasing

humidity and providing insulation from variations in external environmental conditions; the process is considered as a form of 'maturation' of the caves. Various models of succession are considered, which might help to account for the disappearance of lavicoles from mature epigean and hypogean communities.

**KEY WORDS:-** Faunal succession - volcanic habitats - lava flows - caves - aeolian ecosystems - Canary Islands - arthropods - lavicole - troglobite.