

Pandanus pistillaris in the Caroline Islands: An Example of Long-Range Oceanic Dispersal

BENJAMIN C. STONE¹

IN CONJUNCTION with the current revision of the genus *Pandanus* (St. John, 1960; St. John and Stone, in sched.) it seems appropriate to mention the factors of dispersal operative in the genus. Since a number of species of *Pandanus* are littoral in habitat, and because at least one (if not several) species is found on nearly every tropical atoll in the Pacific, it has rightly been assumed that oceanic dispersal of the buoyant fruits is responsible for the distribution. There is no question that throughout vast island groups in Micronesia, Melanesia, and Polynesia *Pandanus* has long been part of the indigenous vegetation. There are, in fact, some indications that oceanic dispersal accounts for the farthest limits of the genus, in West Africa at one extreme, Polynesia at the other, the Bonin Islands in the north, and Australia in the south. The actual number of species involved is not yet known, but species of section *Pandanus* (section *Keura* of earlier authors; see St. John, 1960) play a prominent role, especially in the Pacific region. Certain species of other sections of the genus also are primarily ocean-distributed (for example, *Pandanus dubius* Spreng., and *Pandanus tetradon* (Gaud.) Balf.f.). In general, fruits of these species which are buoyant in seawater exhibit anatomical structures which are presumably adaptations to permit, or prolong, flotation. Brown (1931) has discussed the tissues present in fruits of certain Polynesian species, and uses the apt term aerenchyma to designate the light, pithy, upper mesocarp of such fruits. In addition, the seeds are encased in a highly

sclerified osseous endocarp which, except for the minute apertures at either end, are nearly impervious to water. Fruits of this type are capable of remaining afloat for a considerable period. No experiments or observations seem to be available, but it would appear quite probable that a period of 6 months or 1 year in the ocean would not be an exaggerated estimate of the time in which floating fruits could be dispersed by currents.

The vast areas encompassed by some of these species or groups of species with buoyant fruits, and the considerable taxonomic difficulties encountered in the groups, have not heretofore permitted any definite observations to be made with respect to direction of dispersal. Over a period of many years, and because of numerous observations, the knowledge of the currents in the Pacific is now in a position to be of value in problems of oceanic dispersal; but when grave doubt exists as to the nature (and number) of entities involved, little can be said except the obvious, that *Pandanus* species of littoral areas are probably ocean dispersed.

The specimen discussed below, however, because of its unique character, is a reasonably accurate indication of one route of oceanic dispersal. Because it represents a species which is a member of section *Intraobtusatus* St. John, it is at once distinguishable from the widely dispersed members of section *Pandanus*.

The specimen was collected by Dr. Ryoza Kanehira, late professor at Kyushu University, Fukuoka, Japan; the label reads, "Mokil Atoll; March 12, 1937, Kanehira no. 4203; nom. vernac. "arowan." Mokil Atoll is an isolated atoll roughly 110 mi. east of Ponape, at 6° 40' N., 159° 45' E., consisting of three islands on a circular reef. In April 1957 the present writer visited Mokil, spending the day of the 16th botanizing on the major islet. During this period, 15 numbers of *Pandanus* were collected (all of section *Pandanus*) and many vernacular names

¹ Department of Botany, U. S. National Museum, Smithsonian Institution, Washington 25, D. C. This work was carried out while the author was Research Assistant (under N. S. F. Grant 1834) at the University of Hawaii, Dr. H. St. John, principal investigator. Grateful acknowledgment is expressed to Dr. St. John for his aid, and to Dr. M. S. Doty and Dr. T. F. Austin, of the University of Hawaii, and Y. Sinoto of the B. P. Bishop Museum, for their criticism of this contribution. Manuscript received January 9, 1961.

of plants. The name mentioned by Kanehira "arowan," is a general term used to designate any wild (i.e., nonedible) *Pandanus* or its fruit. The word is apparently of Marshallese origin, where the preferred spelling is "edwaan" (the *d* rolled like an *rr*). The other two islets of Mokil were not seen, so there is no corroborative information regarding the Kanehira collection. There seems no reason, however, to doubt Kanehira's data, and it is assumed that the specimen is indeed from Mokil.

The specimen consists of several phalanges, or keys, of the fruit. The configuration of the carpels which, fused, make up each phalange, determine the section of the genus, and the peculiar "focussed" pattern, as pointed out by St. John (1960) in his discussion of section *Intra-obtusus*, is apparent. Although somewhat smaller than Martelli's description and figure indicate, the Kanehira specimen appears to be referable to *Pandanus pistillaris* Martelli. This species, and in fact the section itself, is known only from Melanesia, specifically, from the Bismarck Archipelago. Similar species, and a closely related section (*Lateriobtusus* St. John) occur in New Guinea.

In December 1957 the author observed species of these sections—in particular, *P. pistillaris*—in their native habitats in New Ireland and New Britain. The trees are characteristic of lowland areas, although they may occur at altitudes of 300 m. or more. Frequently they are found along streams, and not uncommonly, near the coast, especially (as near Kavieng, New Ireland) on limestone. Phalanges which had fallen from these trees were occasionally seen as drift along the stream estuaries and along adjacent beaches around Kavieng and northwestern New Ireland. In this area, a considerable variation in fruit size was observed, much more than is indicated by Martelli's description; because of this, and the above factors, the Kanehira specimen, without much hesitation, can be placed as *P. pistillaris*.

If this is established, it is interesting to consider the possibilities for drift. One obstacle is our meagre knowledge of the full, natural range of *P. pistillaris*; there seems, however, to be little question that, if it is not actually endemic in the Bismarck Archipelago, it is restricted to that

general area. From a study of the excellent charts provided by Schott (1939) and by Wyrcki (1957), it may be seen that a strip about 5 to 7° north of the equator and east of the 140° meridian, during both seasons of the year, is characterized by a more or less constant eastward flow, which in northern winter emanates from the Mindanao-Morotai region, and in northern summer emanates also from a strong current moving westward and slanting northward along the upper edge of the Melanesian area, but reversing its course in the Mindanao-Morotai region. The northern summer current spans a wider course along the equator, reaching nearly all of the Caroline Islands (except perhaps Palau and Yap) and proceeding possibly beyond the Marshalls. During this season, the route of a drifting object starting from New Britain or in that vicinity would be westward along the northern coast of New Guinea as far as Morotai, thereafter more or less directly eastward through Micronesia. During northern winter, counter currents forming a strong oceanic stream along the northern coast of New Guinea would prevent such a route of drift, while several minor whorl systems in the area bounded by the Admiralty Islands on the west and by the Solomons on the east would make the drift pattern irregular and unpredictable, possibly even somewhat southward. The actual number of miles and the elapsed time at sea must remain a matter of conjecture. No information is available as to the length of time over which floating phalanges may be viable; but indirect evidence (cf. Edmondson, 1941, for data on viability of coconuts after ocean flotation) appears to indicate that distances of 1,000 mi. or more are possible.

Thus it may be seen that the route of drift of an object afloat near the Bismarck Archipelago might, by the devious route outlined, terminate in Mokil Atoll or others of the Caroline Islands. Corroboration of such a route is available. Both Riesenbergs (1959) and Sinoto (1960) have reported New Guinea canoe prows washed ashore in the Marshall Islands. Riesenbergs (personal communication) has photographs of an entire canoe in the Marshalls which apparently drifted along this same route. Sinoto describes a New Guinea canoe prow which drifted to Nukuoro Atoll.

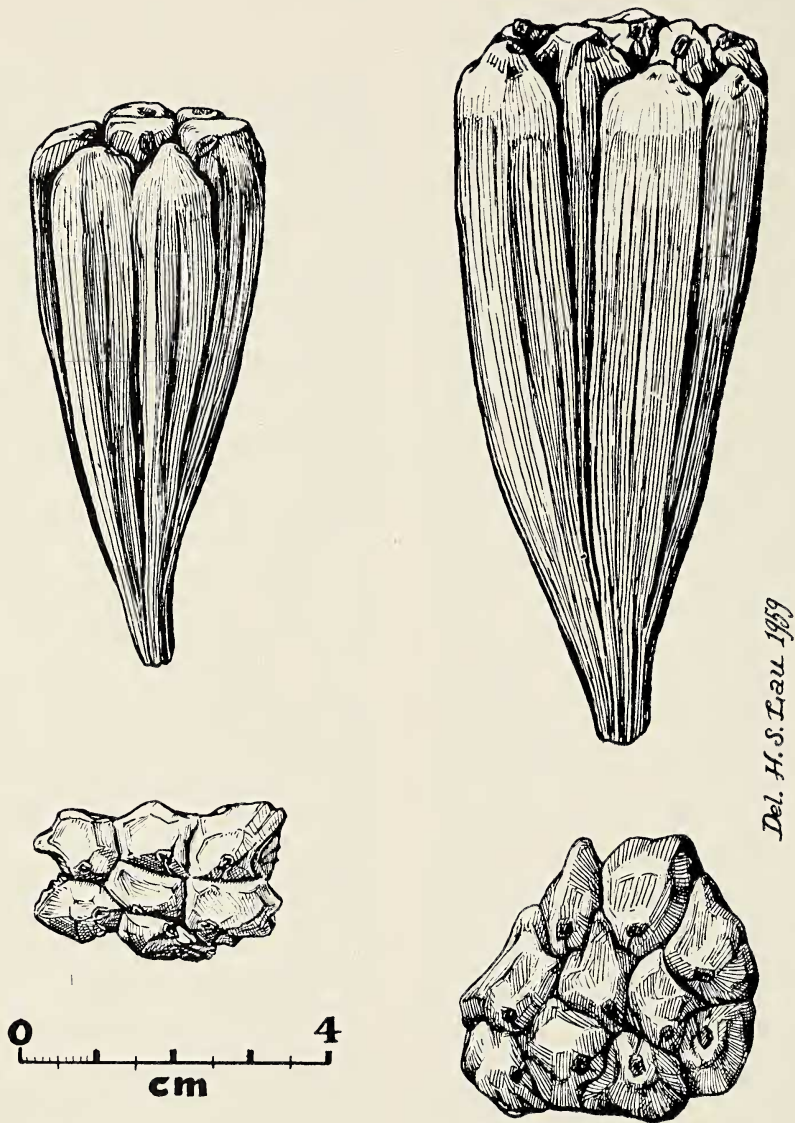


FIG. 1. *Pandanus pistillaris* Martelli. Phalanges in lateral view, natural size, and in top view. Drawn from Kanehira 4203 from Mokil Atoll, Caroline Islands.

It is postulated that the collection of *Pandanus pistillaris* in Mokil Atoll is a further example of such a route of drift. The Kanehira specimens (two of the several phalanges) are here illustrated (Fig. 1).

REFERENCES

- BROWN, F. B. H. 1931. Flora of south-eastern Polynesia, I. Monocotyledons. Bishop Mus. Bull. 84: 1-194, pls. 1-35.
- EDMONDSON, C. H. 1941. Viability of coconut seeds after floating in the sea. Occas. Pap. Bishop Mus. 16(12): 293-304.
- MARTELLI, U. 1914. Le Specie e varietà nova di *Pandanus* menzionate nelle Enumerazione delle Pandanaceae. Webbia 4(2): 399-435, pls. 1-43.
- RIESENBERG, S. H. 1959. A New Guinea canoe prow found in the Marshall Islands. Jour. Polynesian Soc. 68(1): 45-46.
- ST. JOHN, H. 1960. Revision of the genus *Pandanus* Stickman, I. Key to the sections. Pacific Sci. 14(3): 224-241.
- SCHOTT, G. 1935. Geographie des Indischen und Stillen Ozeans. C. Boysen Verlag, Hamburg. 413 pp., 37 table-maps, 1 folding map.
- 1939. Die äquatorialen Strömungen des westlichen Stillen Ozeans. Annal. Hydrographie und Maritimen Meteorologie, for May, pp. 247-257, tables 26-27.
- SINOTO, Y. 1959. Drifting canoe prows. Jour. Polynesian Soc. 68(4): 354-355.
- WYRTKI, K. 1957. Die Zirkulation an der Oberfläche der südostasiatischen Gewässer. Deutsch. Hydrographisch. Zeitschrift 10(1): 1-3, tables 1-2.

Index to Volume XV

Author Index

- ABBOTT, DONALD P.:
The Ascidians of Point Barrow, Alaska, Part I.
Suborder Phlebobranchia (Enterogona), 137-143
- ALVARIÑO, ANGELES:
Two New Chaetognaths from the Pacific, 67-77
- ALVERSON, FRANKLIN G.:
Daylight Surface Occurrence of Myctophid Fishes
Off the Coast of Central America, 483
- ARMITAGE, KENNETH B.:
Studies of the Biology of *Polychoerus carmelensis*
(Turbellaria: Acoela), 203-210
- BERGMAN, R. A.:
The Anatomy of *Coluber radiatus* and *Coluber melanurus*, 144-154
- BERGQUIST, PATRICIA R.:
A Collection of Porifera from Northern New Zealand, with Descriptions of Seventeen New Species, 33-48
- BIERI, ROBERT:
Post-larval Food of the Pelagic Coelenterate, *Vella lata*, 553-556
- BROWNLIE, G.:
Studies on Pacific Ferns.
Part III. The Lindsaeoid Ferns, 64-66
Part IV. The Pteridophyte Flora of Pitcairn Island, 297-300
- CHAKRAVARTI, DIPTIMAN AND RONALD EISLER:
Strontium-90 and Gross Beta Activity in the Fat and Nonfat Fractions of the Liver of the Coconut Crab (*Birgus latro*) Collected at Rongelap Atoll during March 1958, 155-159
- CHAPMAN, V. J.:
A Contribution to the Ecology of the Kermadec Islands, 347-351
- COOKE, WILLIAM BRIDGE:
Fungi from Raroia in the Tuamotu Archipelago, 186-188
- DAWSON, E. YALE:
A Guide to the Literature and Distributions of Pacific Benthic Algae from Alaska to the Galapagos Islands, 370-461
- DOTY, MAXWELL S.:
Acanthophora, a Possible Invader of the Marine Flora of Hawaii, 547-552
- DOTY, MAXWELL S., AND ISABELLA A. ABBOTT:
Studies on the Helminthocladiaceae (Rhodophyta): *Helminthocladia*, 56-63
- DUMBLETON, L. J.:
The Aleyrodidae (Hemiptera-Homoptera) of New Caledonia, 114-136
- GREY, MARION:
Fishes Killed by the 1950 Eruption of Mauna Loa, Part V. Gonostomatidae, 462-476
- FLORA, CHARLES J.:
The Species Commonality Index: A Method for Comparing Habitats, 307-308
- HARTMAN, OLGA:
New Pogonophora from the Eastern Pacific Ocean, 542-546
- HILL, PETER J. R., AND BENJAMIN C. STONE:
The Vegetation of Yanagi Islet, Truk, Caroline Islands, 561-562
- HOBSON, E. S., F. MAUTIN, AND E. S. REEVE:
Two Shark Incidents at Eniwetok Atoll, Marshall Islands, 605-609
- JAMESON, E. W., JR.:
Relationships of the Red-backed Voles of Japan, 594-604
- JOHNSON, MARTIN W.:
On Zooplankton of Some Arctic Coastal Lagoons of Northwestern Alaska, with Description of a New Species of *Eurytemora*, 311-323
- KANEHIRO, YOSHINORI, AND LYNN D. WHITTIG:
Amorphous Mineral Colloids of Soils of the Pacific Region and Adjacent Areas, 477-482
- KAY, ALISON:
A New Opisthobranch Mollusc from Hawaii, 112-113
- KING, JUDITH E., AND R. J. HARRISON:
Some Notes on the Hawaiian Monk Seal, 282-293
- KLAWE, W. L.:
Notes on Larvae, Juveniles, and Spawning of Bonito (*Sarda*) from the Eastern Pacific Ocean, 487-493
- KOHN, ALAN J.:
Studies in Spawning Behavior, Egg Masses, and Larval Development in the Gastropod Genus *Conus*, Part I. Observations on Nine Species in Hawaii, 163-179
- DE LAUBENFELS, M. W.:
Porifera of Friday Harbor and Vicinity, 192-202
- MACDONALD, GORDON A., AND TAKASHI KATSURA:
Variations in the Lava of the 1959 Eruption in Kilauea Iki, 358-369
- MARTIN, W. E.:
Life Cycle of *Mesostephanus appendiculatus* (Ciurea, 1916) Lutz, 1935 (Trematoda: Cyathocotylidae), 278-281
- PLUCKNETT, D. L., AND B. C. STONE:
The Principal Weedy Melastomaceae in Hawaii, 301-303

- NOFFSINGER, T. L.:
Leaf and Air Temperature under Hawaiian Conditions, 304-306
- RANDALL, JOHN E.:
A Contribution to the Biology of the Convict Surgeonfish of the Hawaiian Islands, *Acanthurus triostegus sandvicensis*, 215-272
- REISH, DONALD J.:
A New Species of *Micronereis* (Annelida, Polychaeta) from the Marshall Islands, 273-277
- ROE, SISTER MARGARET JAMES:
A Taxonomic Study of the Indigenous Hawaiian Species of the Genus *Hibiscus*, 3-32
- SAKAGAMI, SHOICHI F.:
An Ecological Perspective of Marcus Island, with Special Reference to Land Animals, 82-104
- SCAGEL, ROBERT F.:
The Distribution of Certain Benthonic Algae in Queen Charlotte Strait, British Columbia, in Relation to Some Environmental Factors, 494-539
- SCHAFFER, RITA D.:
Effects of Pollution on the Free Amino Acid Content of Two Marine Invertebrates, 49-55
- ST. JOHN, HAROLD:
Revision of the Genus *Pandanus* Stickman.
Part 2. *Pandanus* in Western Australia and Notes on the Section *Foullioya*, 180-185
Part 3. A New Species from Oeno Island, Tuamotu Archipelago, 324-326
Part 4. Disposition of Some Later Homonyms, 327
Part 5. *Pandanus* of the Maldive Islands and the Seychelles Islands, Indian Ocean, 328-346
Part 6. New *Pandanus* Species from Queensland, Australia, 563-575
Part 7. New Species from Borneo, Papua, and the Solomon Islands, 576-590
- STONE, BENJAMIN C.:
Pandanus pistillaris in the Caroline Islands: An Example of Long-range Oceanic Dispersal, 610-613
- SUND, PAUL N.:
Two New Species of Chaetognatha from the Waters off Peru, 105-111
- UCHIDA, RICHARD N.:
Hermaphroditic Skipjack, 294-296
- WATSON, J. S.:
Feral Rabbit Populations on Pacific Islands, 591-593
- WELLS, JOHN W.:
Notes on Indo-Pacific Scleractinian Corals, Part 3. A New Reef Coral from New Caledonia, 189-191
- WENTWORTH, C. K., H. A. POWERS, AND J. P. EATON:
Feasibility of a Lava-diverting Barrier at Hilo, Hawaii, 352-357
- WINKLER, LINDSAY R.:
Preliminary Tests of the Toxin Extracted from California Sea Hares of the Genus *Aplysia*, 211-214
- WINKLER, LINDSAY R., AND BERNARD E. TILTON:
Interspecific Differences in the Reaction to Atropine and in the Histology of the Esophagi of the Common California Sea Hares of the Genus *Aplysia*, 557-560
- WOODLAND, D. J.:
Description of a New Species of *Pranesus* (Atherinidae: Pisces) from the Capricorn Group, Great Barrier Reef, 540-541
- WOODWICK, KEITH H.:
Polydora rickettsi, a New Species of Spionid Polychaete from Lower California, 78-81

Subject Index

- Aptos aptos*, 44
Acanthophora spicifera, 547-551
Acanthurus triostegus sandvicensis, 215-272
Adiantum bispidulum, 298
Adocia parietaloides, n. sp., 37
venustina, n. sp., 37
Aleurocanthus brevispinosus, n. sp., 115-116
multispinosus, n. sp., 116-118
nudus, n. sp., 118
spinothorax, n. sp., 118-120
Aleyrodidae of New Caledonia, 114-136
algae, benthic, of Pacific, guide to literature of, 370-561
algae, benthonic, in Queen Charlotte Strait, 494-539
amino acid content of two marine invertebrates, 49-55
Angiopteris chauiodontia, 297
Anthostomella sp., 186
Aplysia californica, 211-214; 557-560
vaccaria, 211-214; 557-560
Araiophos, n. gen., 463-465
gracilis, n. sp., 465-467
Argyripnus atlanticus, 468-470
ephippiatus, 471
irridescens, 473
sp., 473
Arthressa evansi, n. sp., 112-113
Arthrostemma latifolium, 301, 303
Ascidia callosa, 137-139
ascidians of Alaska, 137-143
Asplenium nidus, 299
obtusatum, 299
Atyrium polyantbes, 299
atropine, effect of, upon *Aplysia* spp., 557-560
Auricularia mesenterica, 186
Axiarnnon erecta, 41

- Bantamia merleti*, n. sp., 189–191
Bemisia cordylinididis, n. sp., 120–121
Benthoosema pterota, 483
 beta activity in coconut crab, 155–159
Biemna rhabderemioides, n. sp., 40
Birgus latro, 155–158
 bonito, notes on larvae, juveniles, and spawning, 487–493
 Borneo, new species of *Pandanus* from, 576–590
Burtonanchora lacunosa, 195–197
- Callyspongia ramosa*, 36
Carcbarbinus menisorrah, 605–609
Centropages abdominalis, 317
Cerithidea californica, 278–281
Chelysoma inaequale, 140–142
 macleayanum, 139–140
Choanites suberea var. *lata*, 201
Clethrionomys, 595–597
 andersoni, 599
 imaizumii, n. sp., 599–600
 niigatae, 599
 rufocanus bedfordiae, 597
 rutilus mikado, 600
Clidemia hirta, 301, 303
Cliona celata, 44, 201
 muscoidea, 44
Coluber melanurus, 152–154
 radiatus, 144–152
Conus abbreviatus, 164–166
 catu, 166–169
 imperialis, 169
 leopardus, 169–170
 lividus, 170–171
 pennacens, 171–173
 quercinus, 173–174
 rattus, 174–175
 vitulinus, 175–176
 corals, scleractinian, from Indo-Pacific, 189–191
Corticella novae-zealandiae, n. sp., 45
Cyathea cumingii, 298
Cyclosorus parasiticus, 299
Cyclothone sp., 463
- Danaphos oculatus*, 467–468
Davallia solida, 298
Dialeurodes dothioensis, n. sp., 121–122
 dumbeaensis, n. sp., 122–123
 psychotriacae, n. sp., 123–124
Dicranopteris linearis, 297
Doodia media, 299
Dothioia, n. gen., 124
 bidentatus, n. sp., 124–126
Dysidea cristagalli, n. sp., 33
- Ectyodoryx parasitica*, 197
 Eniwetok Atoll, shark incidents at, 605–609
Eurytemora foveola, n. sp., 317–321
 pacifica, 317
Euthenomys kageus, 601
 smithi, 600–601
- Foullioya*, 184–185
- Galaxea fascicularis*, 191
Gomenella, n. gen., 126
 multiplora, n. sp., 126–127
 reflexa, n. sp., 127–129
Gonostoma atlanticum, 462–463
 Great Barrier Reef, new *Pranesus* from, 540–541
- Halichondria moorei*, n. sp., 40
 panicea, 41
Haliclona clathrata, 35
 glabra, n. sp., 35
 heterofibrosa, 35
 isodictyale, n. sp., 34
 permollis, 193–194
 petrosioides, 36
 tenacior, n. sp., 34
Haliotis cracherodii, 49–55
 Hawaiian monk seal, 282–293
Helicomycetes roseus, 187
Helicosporium lumbricoides, 187
Helix aspersa, 211–214
Helminthocladia rhizoidea, n. sp., 60–63
 simplex, n. sp., 56–60
Heterocentron subtriplinervium, 301, 303
Hibiscus, taxonomic study of indigenous Hawaiian species, 3–32
Hibiscus Arnottianus, 26–30
 f. *parviflora*, 30–31
 f. *punaluuensis*, 31
Brackenridgei, 9–11
 var. *kauaiana*, 12
 var. *mokuleiana*, n. var., 12–13
 var. *molokaiana*, 11–12
 immaculatus, n. sp., 22–24
 kabili, 21
 Kokio, 14–17
 var. *pukoonis*, 17–18
 Newhousei, n. sp., 22
 Saintjohnianus, n. sp., 18–21
 waimeae, 24–26
 Youngianus, 6–8
Hymeniacion perlevis, 41
Hypoxylon chrysoconium, 186
 investiens, 186
- Iophon chelifera californiana*, 198
Ircinia novae-zealandiae, n. sp., 33
Isocrella incrustans, n. sp., 42
- Japan, red-backed voles of, 594–604
- Katsuwonus pelamis*, 294–296
 Kermadec Islands, ecology of, 347–351
 Kilauea Iki, eruption of 1959, 358–369
- lava-diverting barrier, feasibility of, 352–357
Leucopogonella, n. gen., 129
 apectenata, n. sp., 129–130
 pallida, n. sp., 130–131

- simila*, n. sp., 131-132
sinuata, n. sp., 132
Leucosolenia nautilia, 192
Limnocalanus grimaldi, 316-317
 johansenii, 317
Lindsaea dimorpha, 64
 lapeyrousii, 64
 nervosa, 65
Lissodendorynx firma, 194-195
 noxiosa, 195
Loxoscaphe gibberosum, 299
- Maldive Islands, *Pandanus* of, 328-346
 Marcus Island, ecological perspective of, 82-104
Medinilla magnifica, 301
Melastoma decemfidum, 301-303
 malabatbricum, 301-303
Mesostephanus appendiculatus, 278-281
Microciona coccinea, n. sp., 38
 heterospiculata, 38
 rubens, n. sp., 38
Micronereis eniwetokensis, n. sp., 273-277
Monachus schauinslandi, 282-293
Mycale adhaerens, 198-199
 rara, 39
 myctophid fishes, daylight surface occurrence of, 483
- Nephrolepis biserrata*, 298
 birsutula, 298
 new combination:
 Phymatodes pitcairnense, 300
 Schizoloma prolongata, 65
 new genus:
 Araiophos, 463-465
 Dotbioia, 124
 Gomenella, 126
 Leucopogonella, 129
 new name:
 Pandanus glauciferus, 327
 New species:
 Adocia parietalioides, 37
 venustina, 37
 Aleurocanthus brevispinosus, 115-116
 multiispinosus, 116-118
 nudus, 118
 spinihorax, 118-120
 Araiophos gracilis, 465-467
 Arthbressa evansi, 112-113
 Bantamia merleti, 189-191
 Bemisia cordylinidis, 120-121
 Biemna rhabderemioides, 40
 Clethrionomys imaizumii, 599-600
 Corticella novae-zealandiae, 45
 Dialeurodes dotbioensis, 121-122
 dumbeaensis, 122-123
 psychotriacae, 123-124
 Dysidea cristagalli, 33
 Eurytemora foveola, 317-321
 Gomenella multipora, 126-127
 reflexa, 127-129
 Halichondria moorei, 40
 Haliclona glabra, 35
 isodictyale, 34
 tenacior, 34
 Helminthoclada rhizoidea, 60-63
 simplex, 56-60
 Hibiscus immaculatus, 22-24
 Newhousei, 22
 Saintjohnianus, 18-21
 Ircinia novae-zealandiae, 33
 Isociella incrustans, 42
 Leucopogonella apectenata, 129-130
 pallida, 130-131
 simila, 131-132
 sinuata, 132
 Microciona coccinea, 38
 rubens, 38
 Micronereis eniwetokensis, 273-277
 Orchamoplatus perdeniatus, 133-134
 Pandanus adduensis, 328-331
 Andersonii, 576-579
 convexus, 180-182
 feruliferus, 324-326
 Fosbergii, 331-333
 fruticosus, 579
 Hartmanii, 333-335
 Karikayo, 335-339
 kimberleyanus, 182-184
 magnicavernosus, 587-590
 maldivicus, 339-341
 oblatus, 569-570
 ruber, 579-583
 somersetensis, 570-573
 sphaericus, 563-565
 truncatus, 573-575
 yuleensis, 583-587
 Parabemisia reticulata, 134-135
 Phorbas intermedia, 36
 Polydora rickettsi, 78-81
 Polymastia fusca, 43
 Pranesus capricornus, 540-541
 Rhabderemia stellata, 41
 Sagitta bierii, 67-71
 euneritica, 72-76
 peruviana, 105-108
 popovicii, 108
 Siboglinum veleronis, 542-546
 Stylissa stipitata, 199-200
 Suberites cupuloides, 42
 Syringella amphispicula, 200
 Tetraleuroides submarginata, 135-136
 new variety:
 Hibiscus Brackenridgei var. *mokuleiana*, 12-13
- oceanic dispersal of *Pandanus pistillaris*, 610-613
Oidium curtisii, 187
Opblitaspongia pennata, 198
Orchamoplatus perdeniatus, n. sp., 133-134
Oryctolagus cuniculus, 591-593
Oxyspora paniculata, 301

- Pachygrapsus crassipes*, 49–55
Pandanus adduensis, n. sp., 328–331
 Andersonii, n. sp., 576–579
 Balfourii, 341
 compressus, 327
 convexus, n. sp., 182–184
 ferromontanus, n. sp., 565–569
 feruliferus, n. sp., 324–326
 Fosbergii, n. sp., 331–333
 fruticosus, n. sp., 579
 glauciferus, nom. nov., 327
 Hartmanii, n. sp., 333–335
 Hornei, 341–345
 Karikayo, n. sp., 335–339
 kimberleyanus, n. sp., 180–182
 magnicavernosus, n. sp., 587–590
 maldivecus, n. sp., 339–341
 multiispicatus, 346
 oblatus, n. sp., 569–570
 pistillaris, 610–613
 ruber, n. sp., 579–583
 sechellarum, 346
 somersetensis, n. sp., 570–573
 sphaericus, n. sp., 563–565
 truncatus, n. sp., 573–575
 yuleensis, n. sp., 583–587
Phorbas intermedia, n. sp., 36
Phymatodes pitcairnense, n. comb., 300
 Pitcairn Island, pteridophyte flora of, 297–300
Plakina monolopha, 47
 trilopha, 47
Polychoerus carmelensis, 203–210
Polydora rickettsi, n. sp., 78–81
Polymastia fusca, n. sp., 43
 granulosa, 44
 Porifera from northern New Zealand, 33–48
Pranesus capricornus, n. sp., 540–541
Psilotum nudum, 297
Pterolepis glomerata, 301, 303
Pyrrosia angustata, 299
 Queen Charlotte Strait, benthonic algae in, 494–539
 Queensland, Australia, new species of *Pandanus* from, 563–575
 rabbits, feral, populations on Pacific Islands, 591–593
Rhabderemia stellata, n. sp., 41
 Raroia, fungi from, 186–188
Rumobra aristata, 298
Sagitta bierii, n. sp., 67–71
 euneritica, n. sp., 72–76
 peruviana, n. sp., 105–108
 popovicii, n. sp., 108
Sarda chiliensis, 487–493
 orientalis, 487–493
Schizoloma prolongata, n. comb., 65
Schizophyllum commune, 187
Scypha raphana, 192–193
 Seychelles Islands, *Pandanus* of, 328–346
 shark incidents, at Eniwetok Atoll, 605–609
Siboglinum veleronis, n. sp., 542–546
Sigmatocia edapha, 194
 soils, Pacific, and amorphous mineral colloids, 477–482
 Solomon Islands, new species of *Pandanus* from, 576–590
 species commonality index, 307–308
Sphenomeris chusana, 66
Spongia reticulata, 33
 strontium-90 in coconut crab, 155–159
Stylissa stipitata, n. sp., 199–200
Suberites cupuloides, n. sp., 42
Syringella amphispicula, n. sp., 200
Tapeinidium flavicans, 65
Tedania fragilis, 197
Tetraleurodes submarginata, n. sp., 135–136
Tetrazygia bicolor, 301
Thelypteris uliginosa, 298
Tibouchina semidecandra, 301–303
Toxadocia toxophorus, 37
Trichomonas endlicherianum, 297–298
Veleva lata, 553–556
Vittaria elongata, 300
 voles, red-backed, of Japan, 594–604
Xestospongia vanilla, 194
 Yanagi Islet, Truk, vegetation of, 561–562