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A FRESH- AND BRACKISH-WATER TANAIDACEAN, *TANAIS STANFORDI* RICHARDSON, 1901, FROM A HYPERSALINE LAKE IN THE GALAPAGOS ARCHIPELAGO, WITH A REPORT ON WEST INDIAN SPECIMENS

BY

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Although the Tanaidacea are, for the most part, a marine group, some species have penetrated into fresh or brackish water. One of the best known of these species is *Tanais stanfordi* Richardson, 1901 (Tanaidae), first discovered on Clipperton Island in the eastern equatorial Pacific (Richardson, 1901). The known distribution of this species is indicated in table I.

Lang provides a complete synonymy for the species up until 1956 (Lang, 1956: 255). At that time *Tanais stanfordi* was known only from freshwater or brackish environments: "Die Art ist somit hauptsächlich (nur?) im Brack- und Süsswasser angetroffen worden" (Lang, 1956: 256). Although he was not able to examine specimens of *T. philetaerus* Stebbing, 1904, collected in Ceylon and in the Red Sea, Lang states that there can, in his opinion, "kein Zweifel darüber bestehen, dass auch diese Art... mit *T. stanfordi* identisch ist" (Lang, 1958: 537). The salinity at which these specimens were found is unknown. More recent discoveries of the species show it to be considerably more euryhaline than had been previously imagined.

TANAIS STANFORDI IN ARCTURUS LAKE

Tanais stanfordi occurs in Arcturus Lake on the small island of Genovesa (Tower), the most northeastern island in the Galápagos Archipelago. The discovery of *T. stanfordi* in the Galápagos is not surprising, since it is known from Clipperton Island, in the same region of the Pacific. In fact, its presence on the Galápagos Islands has already been noted (Lang, 1958: 539), although the museum label with these specimens contains no specific locality (Lang, personal communication).

That *Tanais stanfordi* occurs in Arcturus Lake, which is separated from the sea, is also not surprising, since other inland collections have been made of this (see table I) and other tanaidaceans. However, the presence of *T. stanfordi* in Arcturus Lake is of special interest because of the unusual chemical conditions of this body of water and the characteristic fresh- and brackish-water distribution of this species.

Arcturus Lake is a circular body of water, centrally located on Genovesa, and

TABLE I

Published records of the distribution of *Tanais stanfordi*

	Location where collected		Salinity	Substrate	Authors
Argentina	Province of Buenos Aires	Río Santiago	?	on the valves of and among *Anodontites trapezialis*	Giambiagi, 1923
Brazil	Río de Janeiro	Jacarépaguá	weakly saline	tubes on Auf-wuchs (bottom, stems of rushes, etc.)	Mañé-Garzón, 1943
Brazil	Río de Janeiro	Jacarépaguá Lagoon	freshwater	?	Mello Leitão, 1941
Brazil	Southern São Paulo State	Cananéia, in mangrove forest	strong freshwater influx	muddy sand; among algae, balanids, on mangrove stems, branches	Lang, 1956
Brazil	Southern São Paulo State	Cananéia, in front of Oceanographic Institution	?	among stones	Lang, 1956
Uruguay	Department of Colonia	Río Uruguay at Conchillas	freshwater	?	Giambiagi, 1923; Mañé-Garzón, 1943
Uruguay	Department of Colonia	Carmelo	freshwater	tubes on bivalves	Mañé-Garzón, 1943
Uruguay	Department of Colonia	Nueva Palmira	freshwater	tubes on bivalves	Mañé-Garzón, 1943
Uruguay	Department of Canelones or S. José	Rio Santa Lucía	variable salinity	submerged stems	Mañé-Garzón, 1943

Uruguay	Department of Maldonado	Laguna del Sauce	mixed	sandy tubes on bivalves	Mañé-Garzón, 1943
Uruguay	Department of Rocha	Lagoon at Castillos	strongly influenced by seawater	on a sub-merged piling	Mañé-Garzón, 1943
St. Lucia, W. I.	6.5 miles S of Castries	Lagoon	freshwater	on stone	new record
Eastern United States	Florida, Dade County	Coral Gables Waterway	maximum S = 20‰	on rocks, algae	McSweeney, unpubl.
Eastern equatorial Pacific	Clipperton Island	Lagoon	?	?	Richardson, 1901
Galápagos Archipelago	?	?	?	?	Lang, 1958
Bismarck Archipelago (Admiralty Islands)	Ndrilo Island, near Manus Island	Outlet to saltwater lagoon	S = 22.2‰ at time of collection (about mean for this area)	sandy bottom, muddy banks	Shiino, 1965; Wolff, 1966, personal communication
Southern Kurile Islands	Kunasiri Island	Lakes Nikisiro-numa and Tohutu-ko	pure freshwater	?	Stephensen, 1936; Uéno, 1936; Miyadi, 1938
		Collections identified as *Tanais philetaerus*			
Sri Lanka	Colombo District	Lake Negombo	salt water lake	coconut pilings	Stebbing, 1904
Sudan	?	Red Sea	?	quay wall	Stebbing, 1909
South Africa	Cape Province	Saldanha Bay	?	in sponges especially intertidal *Hymeniacidon* sp.	Brown, 1957; 1958

an hour's walk inland from Darwin Bay (Howmiller, 1969). According to Colinvaux (1968) the lake is about 450 m across, and is surrounded by cliffs about 70 m high. These cliffs, evidence of volcanic collapse, rise sharply from the talus lying at their base. Both Colinvaux (1968) and Beebe (1926) present photographs of the crater and the lake, and Colinvaux (1968) supplies a topographic diagram of the island.

The lake lies at about sea level, has a maximum depth of about 30 m, and, at least in February, is strongly thermally stratified (Howmiller, 1969). Howmiller (1969) found exceedingly low dissolved oxygen concentrations in the water at 10 m, essentially none at 25 m, and the odor of hydrogen sulfide could be detected from water taken at depths of 12 m and below.

According to Colinvaux (1968) the bottom deposits of the lake have a maximum thickness of seven meters. They are "complexly banded," and include strata of aragonite and pure silica in addition to layers of organic material. This structure indicates "a history of periodic and severally different dramatic events."

Arcturus Lake has a salinity of 48.9 to 52.0‰ (Howmiller, 1969). However, the ionic composition of the salts is about the same as that of seawater (Colinvaux, 1968). Arcturus is by no means the most saline of the Galápagos lakes. According to Colinvaux (1968) they vary from pure freshwater to hypersaline waters that have piles of salt crystals on the bottom and that are inhabited by dense populations of *Artemia* sp.

Although the salinity of Arcturus is one-and-one-half times as great as that of seawater, the lake contains populations of the marine chlorophytes *Enteromorpha* and *Ulva*, and, around the margin of the lake, there is a band of red mangrove bushes, *Rhizophora mangle* L. (cf. Colinvaux, 1968).

The lake is exceedingly eutrophic, as indicated by a Secchi disk transparency of 2.5 m (Colinvaux, 1968), high chlorophyll readings in the surface waters, and productivity measurements (carbon assimilation rate = 3.6 $gC/m^2 24hr$) (Howmiller, 1969). Undoubtedly the major factor contributing to high productivity is the fertilization of the lake water by the excrement from the large numbers of Magnificent Frigatebirds (*Fregata magnificens* Mathews) and boobies (*Sula* sp.) that live in the mangroves and on the crater walls. The quantity of guano produced by these piscivores is so great that it forms a soft, thick, yellow-tan band of sediment around the eastern margin of the lake (Howmiller, 1969).

The fauna of Arcturus Lake is depauperate, as might be expected in so physically stressful an environment (Sanders, 1968). According to Howmiller (1969), there are apparently no fishes, and the dominant species of metazoans are *Trichocorixa beebei* Hungerford, 1948 (a corixid hemipteran), and *Tanais stanfordi*. According to Colinvaux (1968) the fauna also contains coccolithophores, and, in the samples available to me, I have found foraminiferans of the family Lagynidae, possibly *Cystophrys* sp.; ostracods; harpacticoid copepods; and a cumacean.

Tanais stanfordi was collected on 1 March 1968, during Stanford University Oceanographic Expedition 17. The animals were collected by means of a zooplankton net near the shore of Arcturus Lake "between the surface and 0.5 m" in depth (Howmiller, personal communication). Howmiller further states that "they were abundant on the bottom, in detritus derived from mangroves and... on a fine filamentous alga."

Presumably the animals were caught when the plankton net may have scraped the bottom, since *Tanais stanfordi* is a benthonic species. However, it is possible that some of the animals were swimming just above the bottom or were startled by the approaching and possibly scraping net and, swimming off the bottom, were consequently captured.

Howmiller (1969) also found tanaidacean exuvia in zooplankton samples from three "freshwater" ponds at the head of an inlet near Noah's Coves on Isabela (Albemarle) Island (about 00°41′S 91°16′W; 6.4 km west of Point Moreno). The ponds are situated about 60 to 120 m from the inlet, and they range in salinity from 4.87 to 23.8‰, in each case the salinity increasing with depth (Howmiller, 1969).

Although there is no way of being sure, the species collected may be *Tanais stanfordi*; the environment of these ponds closely resembles habitats so characteristic of this species. (See Howmiller, 1969, for a detailed ecological description of these ponds).

The occurrence of *Tanais stanfordi* in Arcturus Lake is as unusual with respect to the chemical composition of the water as any record known to me for the Tanaidacea. Although, according to Colinvaux (1968), the proportions of the dissolved salts approximate those of seawater, the high salinity and the effects of large amounts of avian excrement on a restricted body of water such as Arcturus Lake are apparently unique.

THE DISTRIBUTION OF TANAIS STANFORDI

The substrates upon which *Tanais stanfordi* can be found are diverse (see table I). It constructs its tubes on hard or soft bottoms, on plants (algae, rushes, and mangroves) and, if the identification of *T. philetaerus* Stebbing, 1904, from South Africa is correct, within the canals of sponges.

Tanais stanfordi is an extremely euryhaline species, tolerating a much greater range of salinity than previously suspected, from pure freshwater to 52‰ in Arcturus Lake.

If the identification of *Tanais philetaerus* with *T. stanfordi* is correct, this species is now known from all continents but Europe, Australia, and Antarctica. It tolerates a considerable range of temperature, from that of the Galápagos and Bismarck Archipelagoes to that of the Kurile Islands. Presumably the species is cosmopolitan, ranging along the coasts of the Atlantic, Pacific, and Indian Oceans in lagoons, lakes, estuaries, and rivers. Whether or not it occurs in fully marine localities is still unknown. So far, all collections of those specimens definitively identified as this species, with the exception of the animals from Arcturus Lake, are limited to enclosed basins or rivers where they have been under the influence of freshwater. On the other hand, *Tanais stanfordi* does not seem to penetrate far up into rivers, and has not been found in lakes appreciable distances inland. Some tanaidaceans, such as *Nototanais beebei* Van Name, 1925, have penetrated farther. *N. beebei* has been reported by Van Name (1925, 1936) from freshwater at Kartabo, Guyana, about 77 km (48 miles) up the Essequibo River.

As an inhabitant of fresh and brackish waters, *Tanais stanfordi* often occurs among heterogeneous biota, alongside elements that are distinctly marine in origin (e.g., polychaetes, balanoid cirripedes, sphaeromid isopods) and those that are secondarily derived from fluviatile or lacustrine sources (e.g., phylactolaemate bryozoans and spongillid sponges). In Arcturus Lake a similar mixture is observed, with marine components (*Enteromorpha*, *Ulva*, and cumaceans) being present as well as those presumably brought to Genovesa from non-marine environments on other islands or the mainland (*Trichocorixa*).

ORIGIN OF GENOVESA, ARCTURUS LAKE WATER, AND THE LAKE FAUNA

The age of the island, the origin of the water in Arcturus Lake, and the origin of *Tanais stanfordi* on Genovesa are apparently all unknown. The origin of Genovesa, like that of the other Galápagos Islands, is volcanic, and the island rises from a depth of over 2000 m on the abyssal plain. Although there has been some "very recent" volcanic activity on Genovesa, this activity has resulted in eruption from fissures (McBirney & Aoki, 1966). That the crater has lain undisturbed for a long period of time, unlike those on some of the other islands, is indicated by its numerous finely graded strata of sediments. These have been radiocarbon dated as being over 5,000 years old (layers of about 370 to 425 cm depth in a column about five meters in length; Colinvaux, 1969).

The water in Arcturus Lake could have been derived from a variety of sources. Williams (1966) described a "rapid" uplift of 15 m on Isabela (Albemarle) Island, and states that local uplifts are common in volcanic areas. He cites the presence of elevated marine shell deposits as evidence that some of the islands have been uplifted as much as 300 ft. (91 m). The water in Arcturus Lake could have been trapped in the crater as the island rose to its present height of 70 m sometime in the past. Sea level subsidence, or a combination of subsidence and insular rise, might have filled the crater with water.

The lake is at sea level, and may have an unknown connection with the sea by means of lateral cooling cracks, although Colinvaux (1969) did not find evidence of such a connection.

Colinvaux (1968) suggests that a large tsunami-like wave, originating from a volcanic eruption elsewhere in the archipelago, may have contributed water to low-lying lakes. Apparently the largest tsunami reported, in the area of Kamchatka, was estimated at 70 m in height (Kuenen, 1950). If the crater rim on Genovesa was lower with respect to sea level in the past, it may have been filled by such a method.

The salinity of Arcturus Lake water depends upon the influx of freshwater from rainfall and possibly groundwater. The volume of the rainfall is low, the Galápagos lying in a dry climatic zone, and varies appreciably from year to year. At Wreck Bay, on Santa Cruz (Indefatigable) Island, the variation is as much as from 1.4 to 55.9 inches per year (Palmer & Pyle, 1966). Rainfall is especially heavy in years when El Niño is particularly well developed (Sverdrup et al., 1942). Genovesa, being a low and dry island, does not benefit from the more or less continuous cloud-derived drizzle received by higher elevations elsewhere in the archipelago.

The salinity of standing bodies of water such as Arcturus Lake is, in part, the result of a balance between precipitation and evaporation, the latter being particularly high at low latitudes. The average annual rate of evaporation at 0° latitude in the Pacific is 116 cm (46 inches) (Sverdrup et al., 1942). The similarity of the ionic composition of Arcturus Lake water to that of seawater may indicate that its salinity is the result of a balance between precipitation into an original marine pool and subsequent evaporation from its surface. Rain and wind may contribute additional salts. The large deposits of guano in the lake must also contribute to its chemical composition; Howmiller (1969) suggests that this enrichment is the primary source of the lake's increased salinity.

Insofar as is known, Arcturus Lake water has never been fresh. The presence of non-marine organisms such as *Trichocorixa* in the lake is inadequate evidence for an earlier, freshwater stage, because a euryhaline limnicole could invade a saline lake from another brackish or saline basin.

The means by which *Tanais stanfordi* arrived in the Galápagos, probably from the South American mainland, were undoubtedly similar to those of many other littoral benthonts, and these mechanisms have been discussed in detail by Abbott (1966).

IDENTIFICATION OF SPECIMENS AND INTRASPECIFIC VARIATION

That the animals from Arcturus Lake belong to *Tanais stanfordi* is clear from the general appearance of the body (figs. 1*A, B*) and from the chelipedal dentition (figs. 2*B, D*) of these animals. In addition, they also display those characteristics deemed particularly important by Lang (1956: 255) for the recognition of this species: (1) a subterminal spine is present on the female chelipedal dactylus as well as a thin lamella next to its "claw" (fig. 2*B*), and (2) the dactylar tip of pereopod II (= thoracopod III) bears a small ventral notch in both sexes (fig. 2*E*) rather than ending in a simple point.

The Arcturus Lake specimens vary relatively little in other characters from populations described in the literature (mouthparts were not dissected). Of the 134 animals collected in Arcturus Lake, 40 or 29.9% bear rudimentary oostegites (bodily lengths, 2.4 to 4.3 mm, $\bar{x}$ = 3.2 mm, N = 16 — some animals dried out, unmeasurable), five (3.7%) are copulatory females with marsupia (unmeasurable), 43 (32.0%) are copulatory females that have lost their marsupia (2.8 to 4.3 mm, $\bar{x}$ = 2.9 mm, N = 19), seven (5.2%) are copulatory males (2.8 to

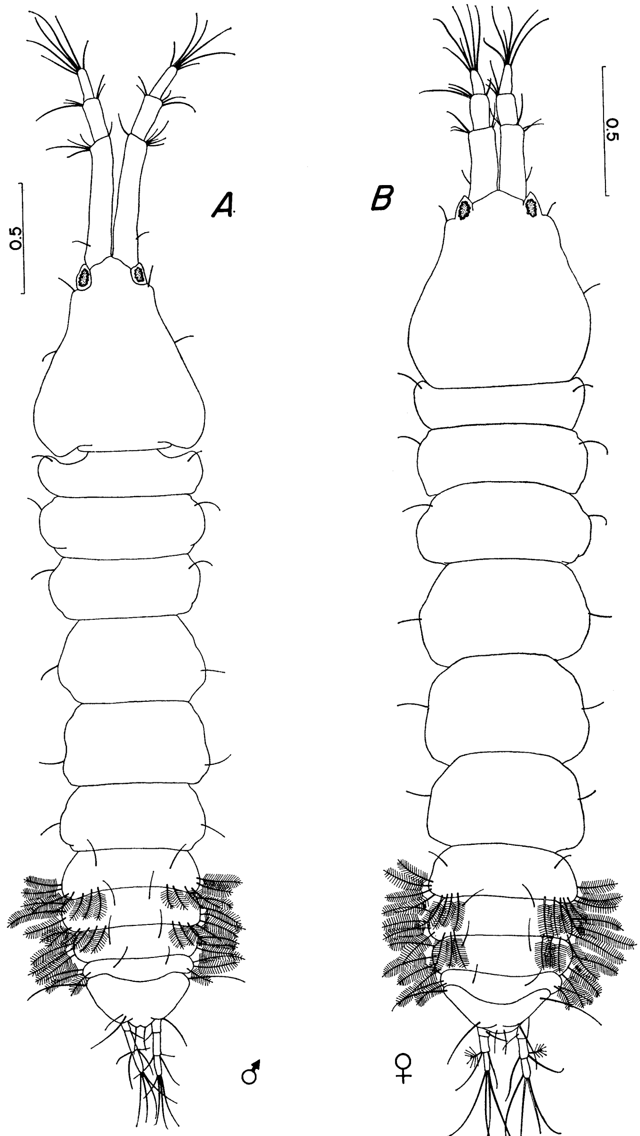

Fig. 1. *Tanais stanfordi* Richardson, 1901, from Arcturus Lake, Galápagos Archipelago. *A,* a copulatory male in dorsal view; *B*, a preparatory female (with rudimentary oostegites) in dorsal view. Scale lines in millimeters.

3.7 mm, $\bar{x}$ = 3.4 mm, N = 7), and 39 (29.1%) are animals of unknown stage, probably including two or more instars (2.2 to 3.6 mm — only several largest and smallest measured). The smallest animal in the collection was 2.2 mm in length.

The following bodily lengths are given by several previous authors for animals from other populations.

Stephensen, 1936	Clipperton Island		
	"♀♀" and copulatory ♂♂	about 3.4 mm	N = ?
	Kunasiri Island, Kuriles		
	♀♀ with marsupium	~ ♂	N = ?
	"♀" without marsupium	3.0 mm	N = 1
	copulatory ♂	2.4 mm	N = 1
Shiino, 1965	Ndrilo Island, Bismarck Archipelago		
	♀ with marsupium	2.6 mm	N = 1
	copulatory ♂	2.4 mm	N = 1
Lang, 1958	Unknown location		
	copulatory ♂♂		
	"forma *typica*"	2.0 to 3.4 mm	N = ?
	"forma *sylviae*"	3.0 to 3.6 mm	N = ?
McSweeny, unpublished	Southern Florida		
	"♀"	2.5 mm	N = 1
	copulatory ♂	2.1 mm	N = 1

The lengths of the animals from the Galápagos are apparently similar to those cited for other populations, but detailed comparisons are not possible because of the low numbers of individuals included in the above accounts.

The shapes of the pereonites and pleotelson (figs. 1*A*, *B*) vary from those of the animals illustrated by Shiino (1965) from the Bismarck Archipelago (Ndrilo Island) and McSweeny (unpubl.) from Florida, but the amount of variation is small for populations separated by such great distances. The carapaces of the copulatory males from Arcturus Lake (fig. 1*A*; carapace length-width ratio, 1.1) are less tapered anteriorly than those of the animals from the other populations, but this disparity may result from the differences pointed out by Lang (1958: 538) between the primary, gonochoristic male ("forma *typica*" of Lang) and secondary, protogynous males (Lang's "forma *sylviae*"). (The carapace length-width ratio of the illustrated female, with rudimentary oostegites, is also 1.1).

The chelipedal dactylar spine deemed diagnostic by Lang (1956: 255) is present but is not pinnate in shape, in contrast to Lang's findings and those of Shiino (1965: 180, fig. 3*E*) and McSweeny (unpubl.: 81, fig. 23*E*) for the animals in their populations. Although the spines are consistently without setules or teeth in the Galápagos specimens, in some individuals the lower margin of the spine is slightly irregular.

Shiino (1965: 180, figs. 3*B*, *D*) describes "scale-like patterns," composed of tiny spinelets, located on the chelipedal dactylar surface. Such scale-like patterns are only faintly visible in the cuticle of the Arcturus Lake specimens, and they are not composed of spinelets on either the medial or lateral surfaces. The specimens from Arcturus Lake display an overall superficial cuticular pattern similar to that described by Lang (1958: figs. 1, 2).

The chelipeds of the copulatory males lack the proximal protuberance at the articulation of the dactylus (fig. 2*D*) illustrated for the animals from Ndrilo Island by Shiino (1965: fig. 4*A*).

In the largest copulatory female (bodily length, 4.3 mm) the carapace shape and dimensions of the first article of antenna 1 approach those of the copulatory males. (This female is much larger than the next largest copulatory female, 3.7 mm). This change in morphology has also been observed by Lang (1958: 538) and is related by him to the protogynous mode of development that he claims for this species.

Representatives of several developmental stages from Arcturus Lake are deposited in the U. S. National Museum of National History, Washington, D.C.: illustrated female, USNM 142667; illustrated copulatory male, USNM 142666; eighteen other specimens, USNM 142668. The collection from St. Lucia is USNM 304428.

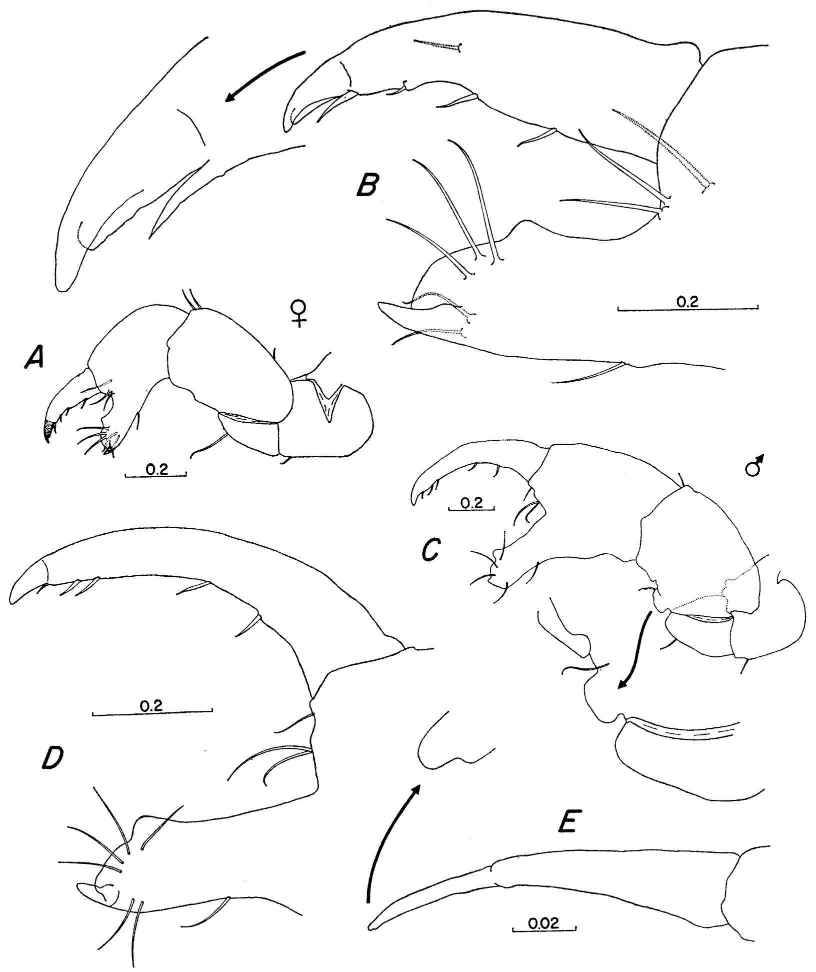

Fig. 2. *Tanais stanfordi* Richardson, 1901, from Arcturus Lake, Galápagos Archipelago. *A*, left cheliped of preparatory female in fig. 1*B*; *B*, chela of same with enlargement of dactylar tip; *C*, left cheliped of copulatory male in Fig. 1*A* with enlargement of ventral carpal margin; *D*, chela of same; *E*, dactylus of left pereopod II of female in fig. 1*B* with enlargement of tip. Scale lines in millimeters.

OOSTEGITES AND MARSUPIUM

In another publication (Gardiner, in press) I have reviewed current knowledge of the form and occurrence of the oostegites among the Tanaidacea. Moers-Messmer (1936: 23-25) describes the marsupium of four species of "*Tanais*." However, since then, each of the four has been referred to another genus, *Zeuxo* or *Pseudotanais*. Lang (1960: 77, 78) discusses the formation and structure of the oostegites of *Tanais* as now construed.

Preparatory females are apparently all of one stage, in contrast to those of the neotanaids (Gardiner, in press). Each bears two long, rudimentary oostegites in cuticular sheaths on the coxae of pereopod V (= thoracopod VI) only (fig. 3*B*). According to Lang (1960: 78) all species of *Tanais* [and *Anatanais* (= *Zeuxo*)] have either one or two brood sacs, and Lang refers to these as ovisacs rather than marsupia. In the specimens of *Tanais stanfordi* from Arcturus Lake, three animals had both pouches remaining: one contained two limb-bud embryos on each side, another had six and seven limb-bud embryos on the left and right sides respectively, and a third had four and five very advanced embryos or mancas 1 on the two sides. A fourth animal had 10 eggs in its one remaining marsupium. The fifth female, a fragment, had an empty marsupium, but four and five eggs were present in its left and right ovaries respectively, and two more were probably present on each side originally. Shiino (1965: 182) describes one copulatory female with four eggs in each marsupium.

The marsupia become detached easily in the laboratory. In contrast with other Tanaidacea, insofar as is known (see Gardiner, in press), when the marsupia become detached, a uniformly shaped stub of oostegal cuticle remains (fig. 3*A*), and this remnant effectively identifies copulatory females. In the family Neotanai-

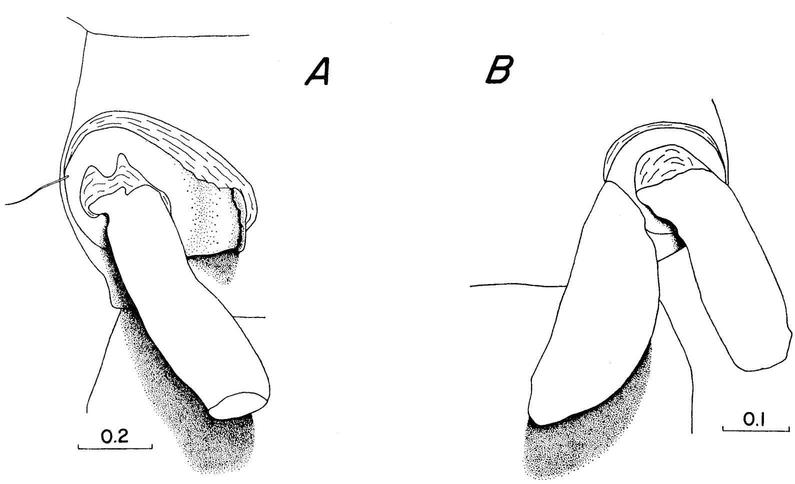

Fig. 3. *Tanais stanfordi* Richardson, 1901, from Arcturus Lake, Galápagos Archipelago. *A*, ventral surface of pereonite 5 (= thoracomere 6) of a copulatory female showing coxa with postmarsupial oostegal stub; *B*, same, preparatory female with rudimentary oostegite (animal in fig. 1*B*). Scale lines in millimeters.

dae (Gardiner, in press) detachment of the oostegites leaves only a coxal scar.

Although the details of the relationship between the coxae of the fifth pereopod (= thoracopod VI) and the surrounding sternite are not always easy to observe, the coxal opening in the sternite is generally larger in the copulatory female than in other instars (cf. figs. 3*A*, *B*). This difference may be a useful means of distinguishing, in growth studies, between preparatory females and copulatory females that have not yet shed their oostegal sheaths.

I did not observe the female gonopores.

OTHER GALÁPAGOS TANAIDACEANS

Other tanaidaceans known from the Galápagos Islands are: *Apseudes galapagensis* Richardson, 1912, collected off San Cristobal (Chatham) Island at 1485 m (Richardson, 1912), *Apseudomorpha veleronis* (Menzies, 1953), collected at about 5.5 m off Santa Maria (Charles) Island (Menzies, 1953), and *Synapseudes hancocki* Menzies, 1953, found among corals in Tagus Cove, Isabela (Albemarle) Island (Menzies, 1953).

None of these species is known from fresh or brackish water. Certainly other species must exist in marine environments around the islands, and, if one were to include the deep-sea, the fauna would undoubtedly be extremely diverse (see Gardiner, in press).

ST. LUCIA SPECIMENS

These animals were collected in a lagoon formed by a sand bank about 40 yds. (about 37 m) wide that separates the mouth of the Anse Galet River, St. Lucia, West Indies, from the sea. The lagoon was probably fresh at the time of collection, since the water did not taste salty, and freshwater shrimps were present (T. E. Bowman, personal communication).

There are 15 specimens in the collection, including two copulatory males (3.2 and 3.5 mm in length) and one copulatory female (4.0 mm) with two ovisacs containing 26 and 31 small eggs respectively.

The major morphological differences between these animals and those in the Galápagos collection as well as those described by Lang (1958) and McSweeny (unpubl.) are mainly noticeable in the shape of the male cheliped. In the St. Lucia males (1) the merus projects forward as a flat lobe, (2) the ventral carpal lobe (fig. 2C) is unusually prominent, (3) the proximoventral margin of the propodus is expanded into a bulge, and (4) the dactylus bears two low proximal lobes of various size on its grasping margin.

This is the first report of *Tanais stanfordi* from the West Indies.

TERMINOLOGY

The terminology used here for morphological features and for developmental stages is discussed by Gardiner (in press).

ACKNOWLEDGEMENTS

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ZUSAMMENFASSUNG

Tanais stanfordi war bisher nur vom Süß- und Brackwasser bekannt. Diese Art wurde jetzt jedoch bei einem Salzgehalt von 52⁰/oo im Arcturus See, welcher in einem Krater der Genovesa Insel im Galapagos Archipel gelegen ist. Der Arcturus See mißt etwa 450 m im Durchmesser und ist 30 m tief. Im Uferwasser einer Seite des Sees befindet sich eine große Ansammlung von Vogelguano, die vermutlich für die starke Eutrophie des Sees verantwortlich ist. *T. stanfordi*, einer der dominierenden Metazoen des Sees, ist häufig im flachen ($<$0,5 m) Wasser. Die Art muß jetzt als extrem euryhaline bezeichnet werden mit einem Salzgehaltsbereich von reinem Süßwasser bis zu einer Salinität von 52⁰/oo. Sie baut ihrer Röhre auf harten und weichen Substraten, Pflanzen und Aufwuchs. Sie wird in allen Kontinenten gefunden mit Ausnahme von Europa, Australien und der Antarktis. Trotz dieser großen geographischen Verbreitung zeigt sie relativ geringe intraspezifische Variationen. *T. stanfordi* wird hier von einer Süßwasserlagune in St. Lucia nachgewiesen. Dies ist der erste Nachweis der Art in den Westindischen Inseln. Nach der Kopulation tragen die Weibchen gewöhnlich zwei Eisäcke, jedoch bestehend aus einem einzigen Oostegit. Jeder der Säcke enthält bis zu 10 Eiern oder 7 Embryos in der Galapagos Kollektion; jedoch wurden bis zu 31 kleine Eiern in einem Eisäck bei Weibchen von St. Lucia gefunden. Nach dem Abwerfen der Oostegiten können reife Weibchen erkannt werden an einem Stutzen oostigaler Cuticula, welcher mit der Coxa verbunden bleibt.

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