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A SYNOPSIS
OF THE
NORTH AMERICAN SPECIES
OF THE
GENUS ALPHEUS.
BY
J. S. KINGSLEY.

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New Alpheus (1852)
Dr. H. Edwards

ART. VII.—A SYNOPSIS OF THE NORTH AMERICAN SPECIES OF
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The materials upon which the following paper is based are the collections of the Peabody Academy of Science at Salem, Mass., and of the Peabody Museum of Yale College at New Haven, Conn., which latter were kindly loaned the writer by Prof. S. I. Smith.

ASTACUS (*pars*), Fabricius, Entomologia Systematica, 1793, ii. 478.

PALEMÓN (*pars*), Oliver, Encyclopédie Méthodique, 1811, v. 656.

ALPHEUS, Fabricius, Suppl. Ent. Syst. 1798, 404.—Latreille, Genera Crustacés et Insectorum, 1806, i. 52; *id.* Considérations Générales sur . . . les Crustacés, etc. 1810, 101.—Say, Journal Academy Natural Sciences, Philadelphia, 1818, i. 243.—Bosc, Hist. Nat. des Crustacés, 2e éd. par Desmarest, 1830, ii. 72.—Gray, in Griffith's Cuvier, Crustacea, 1832, 192.—H. Milne-Edwards, Hist. Naturelle des Crustacés, 1837, ii. 349.—Dana, U. S. Exploring Expedition, Crustacea, 1852, i. 534, 541.—Bell, British Stalk-eyed Crustacea, 1853, 270.

BETÆUS, Dana, *op. cit.* i. 534, 548.—Stimpson, Proceedings Acad. Nat. Sciences, Philadelphia, 1860, 31.

The genus *Alpheus*, as limited by the writer, is characterized by having a compressed form, the carapax being extended forward, forming a hood over the eyes, the rostrum either small or wanting; the antennulæ with a two-branched flagellum; antennæ with a large antennal scale. Mandible deeply bifurcate, the anterior branch being oblong, slender; a mandibular palpus present; external maxillipeds are slender, of moderate length; hands of the first pair generally greatly enlarged, unequal, sometimes the right and sometimes the left being the larger in the same species. The second pair are slender, filiform, chelate, the carpus multiarticulate. The remaining feet and the abdomen present no characters of especial importance.

In 1852, Dana characterized the genus *Betæus*, which differs from *Alpheus*, as accepted by him, merely in the absence of a rostrum and the inversion of the hands, the dactylus being borne on the lower edge of the propodus. That the line separating these two genera cannot be drawn is shown by the fact that *Betæus trispinosus* Stm. is rostrated, while in a large series of *Alpheus minus* Say I found many which wanted the rostrum. The hand also cannot be taken as a guide, for we find forms of *Alpheus heterochelis*, in which the dactylus is a little inclined; in my *Alpheus cylindricus*, it works still more obliquely, while in my *Alpheus transverso-dactylus* its motion is in a horizontal plane. Thus

the species of *Betæus* described by Dana (*truncatus*, *equimanus*, *scabro-digitus*), Stimpson (*australis* and *trispinosus*), and Lockington (*longidactylus* and *equimanus*) will have to be placed in the genus *Alpheus*.

Say, in volume 1 of the Journal of the Academy of Natural Sciences, was the first to mention any North American species of this genus, describing *Alpheus heterochelis* and *A. minus*. Milne-Edwards, in his "Histoire Naturelle des Crustacés", t. ii, describes as new *A. armillatus* from the West Indies, and also gives abstracts of Say's descriptions. DeKay, in the "New York Fauna, Crustacea"; also gives brief diagnoses of the same two species. Gibbes, in the "Proceedings of the American Association for the Advancement of Sciences", vol. iii, reports *A. heterochelis* and *A. minus* from Florida and Charleston, S. C. He also proposes as new *A. formosus*. Henri de Saussure, in his "Mémoire sur Divers Crustacés Nouveaux du Mexique et des Antilles", redescribes *A. heterochelis* under the specific name *lutarius*. He also refers to a previous article (Revue Zoologique, 1857, 99, 100), where, laboring under a misapprehension, he described it as the type of a new genus, *Halopsyche*. Dr. Stimpson, in a critique of this memoir of Saussure (American Journal of Science, 1859, xxvii, 446), pronounces his *lutarius* to be the *heterochelis* of Say. S. I. Smith ("Transactions of the Connecticut Academy of Arts and Sciences", ii, 39) reports *A. heterochelis* from various localities. Dr. Streets, in the "Proceedings of the Academy of Natural Sciences of Philadelphia", 1871, 242, describes *A. bispinosus* from the Isthmus of Panama, but from which coast I am unable to ascertain. Mr. Lockington, in the "Proceedings of the California Academy of Sciences", February 7, 1876, describes *Alpheus bellimanus*, *A. equidactylus*, and *Betæus longidactylus*, this being the first mention of any species from the Pacific coast. In a later paper (March 20, 1876), he adds *Betæus equimanus* and *Alpheus clamator*. This comprises, so far as I am aware, all the literature of the North American *Alpei*.

ALPHEUS MINUS Say.

Alpheus minus Say, Jour. Acad. Nat. Sci. 1818, i, 245.—Edwards, Hist. Nat. des Crustacés, ii, 356.—DeKay, New York Fauna, Crustacea, 26.—Gibbes, Proc. Am. Assoc. Adv. Sci. 1851, 196.
Alpheus formosus Gibbes?, loc. cit. 196.

Carapax smooth; rostrum short, acute; a spine arising from the anterior edge of the hood over each eye equalling the rostrum in length, thus giving the front a three-spined appearance. Basal spine of antennulæ slender, acute, incurved, reaching to the middle of the second basal joint; first joint as long as second and third, second a half longer than the third; flagella ciliated, two-thirds the length of the carapax. Basal spine of antennæ long, slender. Antennal scale regularly elliptical, extending slightly beyond the antennular peduncle; flagellum nearly twice as long as the carapax. External maxillipeds slender, extending beyond the peduncle of the antennulæ. Feet of the first pair greatly unequal; larger hand a third longer than carapax, cylindrical,

slightly tapering toward the extremity; a strong spine above, and a smaller one near it, at the articulation of the dactylus; thumb short, dactylus longer, about one-half as long as the palm. The carpus viewed from the side is somewhat sigmoid in outline; a strong spine upon the upper margin. Meros triangular, sides flat; distal portion of upper margin prolonged into a spine. Smaller hand somewhat similar to the larger; the fingers, however, being equal, slender, and proportionately longer than in the larger hand; carpus and meros smaller than on the other side, and somewhat compressed. Ischium and meros of second pair compressed; carpus five-jointed, first joint equalling the other four in length; second, third, and fourth subequal; fifth slightly longer. Feet of the last three pairs compressed; propodus spinulose on the inferior margin; dactylus biungulate. Telson tapering; extremity rounded.

The majority of specimens of this species that I have seen are quite small, averaging 11.5^{mm} in length. A larger specimen, from Fort Jefferson, Florida, gave the following measurements:—Length of body, 26.3^{mm}; carapax, 10.3^{mm}; basal scale of antennæ, 3.8^{mm}; larger hand, 13.3^{mm}. In a large series of this species, I find the shape of the larger hand as constant as any other character. In some specimens, the ocular spines are present, while the rostrum is wanting; in others, the front is truncate, no spines being present. The proportions of the joints of the carpus of the second pair also vary. While in the majority of the specimens examined they are as given above, in others the first is scarcely longer than the two succeeding. I have examined specimens of this species from Fort Macon, N. C. (*Dr. H. C. Yarrow*), Charleston, S. C., Key West, Fla. (*A. S. Packard, jr.*), Nassau, N. P. A single specimen was sent me from Yale, bearing the label "Bermudas, G. B. Goode", and identified as *Alpheus formosus* Gibbes. It agrees well with Gibbes's description quoted above; but as far as I can see there is nothing to separate it from *A. minus*. The relative lengths of rostrum and ocular spines can be of no great importance when they vary as I have shown. Specimens in the museum of Yale College, from "Pearl Is., Bay of Panama, F. H. Bradley", I cannot separate from Floridan examples. The spines on the front are more acute, and the rostrum somewhat longer than in east-coast specimens. The antennular spines also are not incurved. Other than these, I can detect no important points of difference.

The only other species of *Decapoda* that I know of as being reported from both coasts are:—

Microphrys weddillii Edw. (*vide* A. Edw.).

Hyas coarctatus Leach (*vide* Stm. Jour. Bost. Soc. Nat. Hist. vi, 450).

Acanthonyx petiveri Edw. (*vide* Stm. Ann. N. Y. Lyc. 97).

Domevia hispida Souleyet (*vide* Stm. Ann. Lyc. vii, 218).

Eriphia gonagra Edw. (*vide* Stm. Ann. Lyc. vii, 217).

Achelous spinimanus De Haan (*vide* A. Edw.).

Cronius ruber Stm. (*vide* Stm. Ann. Lyc. vii, 225).

Carcinus maenas Leach. (Prof. S. I. Smith in letters reports this as collected by F. H. Bradley at Panama.)

Uca una Latr. (*vide* A. Edw.).

Nautilograpsus minutus Edw. (*vide* Stm. Ann. Lyc. vii. 231).

? *Acanthopus planissimus* Dana (*vide* Stm. Ann. Lyc. vii. 232).

? *Aratus pisoni* Edw. (*vide* Smith, Rep. Peabody Acad. Sci. 1871, 92).

? *Goniopsis cruentatus* De Haan (*vide* Smith, l. c. 92).

Petrolisthes armatus Stm. (*vide* Stm. Ann. Lyc. vii. 73).

Eupagurus bernhardus Brandt (*vide* Stm. Jour. Bost. Soc. Nat. Hist. vi. 483).

Eupagurus kroyeri Stm. (*vide* Stm. Ann. Lyc. vii. 89).

Crangon boreas Fabr. (*vide* Stm. Proc. Acad. Nat. Sci. Phila. 1860, 25).

Sabinea septemcarinata Owen (*vide* Stm. Proc. Phila. Acad. 1860, 26).

Nectocrangon lar Brandt (*vide* Stm. Proc. Phila. Acad. 1860, 25).

Hippolyte spina White (*vide* Stm. Proc. Phila. Acad. 1860, 34).

Hippolyte grönlandica (J. C. Fabr. sp.) Miers [*H. aculeata* Edw.] (*vide* Stm. Proc. Phila. Acad. 1860, 33).

Pandalus borealis Kroyer (*vide* Stm. Jour. Bost. Soc. vi. 501).

Palæmon jamaicensis Oliv. (*vide* Smith, l. c. 97).

To this list I would add:—

Alpheus minus Say.

Alpheus heterochelis Say.

Alpheus transverso-dactylus Kingsley.

ALPHEUS PANAMENSIS Kingsley.

Near *Alpheus minus* Say. Body very compressed; carapax smooth; rostrum short, separated from the ocular arches by a deep sulcus; the orbital spines arising not from the anterior edge of the carapax, as in *A. minus*, but from the superior surface, the margin being continuous beneath the spines; these spines do not extend so far forward as in the Floridan analogue. Basal spines of antennulæ extending slightly beyond first joint; third joint somewhat shorter than the second. Basal joint of antennæ with a spine beneath; antennal scale extending slightly beyond the peduncles of antennulæ; flagellum nearly as long as the body. External maxillipeds reacting to tip of antennal scale. Hands of the first pair not so disproportioned as in *A. minus*; the larger is smooth, compressed, with the margins entire; dactylus two-fifths the length of the propodus, extending slightly beyond the thumb, with a tooth on the occludent margin shutting into a cavity of the thumb, as in *A. minus* and *A. heterochelis*. The fingers are slightly curved outward, and are somewhat hairy. The smaller hand is nearly as long as, but more slender than, the larger dactylus, slender, half as long as propodus, trigonal, the occludent side being furnished with a ridge, which shuts into a groove in the thumb; the points of the fingers are curved and overlapping. Feet of the second pair short; carpus five-jointed; the first joint as long as the two following; second and fifth subequal, each a half longer than the third or fourth, which are also subequal. Propodal joints of following pairs spinulose beneath. Telson triangular, truncate.

Acajutla, Central America, and Panama (*F. H. Bradley*). Three specimens from the latter locality give the following measurements:—

| Length of body. | Carapax. | Larger hand. |
|--------------------|-------------------|--------------------|
| 29.0 ^{mm} | 8.5 ^{mm} | 12.0 ^{mm} |
| 27.8 | 8.0 | 16.3 |
| 32.0 | 10.0 | 15.0 |

ALPHEUS SULCATUS Kingsley.

Carapax smooth; rostrum short, extending very slightly beyond the vaults over the eyes, which are produced forward, though they can scarcely be called spiniform; sides of the rostrum with long hairs. Basal spine of antennulæ reaching to the second joint; third joint the shortest. Inner branch of flagella a third longer than the carapax; outer about half as long as inner. A small spine on the basal joint of antennæ beneath; antennal scale equalling antennular peduncle, regularly tapering; flagellum nearly as long as the body. External maxillipeds slender, extending beyond antennal scale, the distal joint being ciliated. Meros of larger cheliped triangular; no spine above; hand ovate-compressed, with a few scattered hairs; a slight sulcus on the upper margin of the palm; a furrow on the outer, and a similar one on the inner surface of the hand, running back from the articulation of the dactylus to about the middle of the palm; a slight constriction on the under margin; thumb distorted, a furrow on the outer surface parallel with the occludent margin; dactylus about a third as long as propodus, extending beyond the thumb; a tooth on the inner margin, as in *A. heterochelis*. Carpus of the second pair five-jointed; first joint as long as the next two; second a half longer than third; third and fourth equal; fifth as long as second. Telson tapering-truncate.

Of this form I have seen but two imperfect specimens; one from the Bay of Panama, and the other from Zorritas, Peru (*F. H. Bradley*), which give respectively the following measurements:—

| Length of body. | Carapax. | Larger hand. |
|--------------------|--------------------|--------------------|
| 35.0 ^{mm} | 11.8 ^{mm} | 15.5 ^{mm} |
| 23.3 | 8.0 | 10.3 |

ALPHEUS FLORIDANUS Kingsley.

Carapax smooth, somewhat compressed; rostrum short, acute, the carina running back nearly to the middle of the carapax. Basal spine of antennulæ extending but slightly beyond the rostrum. Second joint of antennular peduncle three times as long as the last joint; outer branch of flagella stout, a little longer than the peduncle; inner branch slender, twice as long as the outer. Antennal scale as long as peduncle of inner antennæ, and shaped as in *A. heterochelis*; flagellum a half longer than the body. Meros of first pair trigonal, the inner inferior edge bearing small spines. Hands unequal, the larger compressed, one and a half times as long as the carapax; fingers equal, pointed, completely closing, occupying about two-fifths the length of the hand.

Smaller hand slightly compressed, as long as larger; fingers longer than palm, the thumb being longer than the dactylus; both very slender, not completely closing, and fringed with long hairs. Ischium of second pair longer than the meros; carpus five-jointed, first joint a little shorter than the second, the last three subequal and together as long as the second. Three posterior pairs without spines on the meral joints; propodi hirsute; dactyli lamellate. Telson tapering, twice as long as broad; the apex obtusely pointed.

| Length of body. | Carapax. | Hand. |
|--------------------|-------------------|--------------------|
| 29.5 ^{mm} | 9.3 ^{mm} | 15.5 ^{mm} |

Fort Jefferson, Florida (*Lieutenant Jacques, U. S. N.*).

ALPHEUS HETEROCHELIS *Say*.

Alpheus heterochelis Say, l. c. i. 243.—Edwards, *op. cit.* 356.—DeKay, *op. cit.* 26.—Gibbes, l. c. 196.—Smith, *Trans. Conn. Acad.* ii. 23, 39.

Alpheus armillatus, Edwards, *op. cit.* ii. 354.

Alpheus lutarius Saussure, *Crustacés Nouv. des Antilles et du Mexique*, 45, pl. iii. f. 24 —v. Martens, *Wiegmann's Archiv für Naturgeschichte*, 1872, 139.

Halopsyche lutaria Saussure, *Revue Zoologique*, 1857, 100 (*teste* Saussure).

Carapax smooth; rostrum short, acute, depressed; ocular arches without spines. Basal spine of antennulæ stout, short, not reaching base of second joint; second joint more than twice as long as third. Outer flagellum half as long as inner. Antennal scale as long as antennular peduncle, the spine on the anterior lateral margin large, stout, acute; inner margin arcuate, widening toward the base; flagellum somewhat longer than the body. Feet of the first pair unequal; meros joint triangular; carpus as broad as long. Larger hand one and a half times as long as carapax, compressed, margins rounded; a constriction of the upper and under margins at about the middle. Thumb three-fourths as long as palmar portion, a strong rectangular tooth on inner portion of occludent margin; apex acute. Dactylus with a process on the inner margin, which shuts into a cavity in the opposing thumb; points of fingers overlapping. The smaller hand cylindrical, the constrictions but faintly indicated; fingers three-fourths as long as palm. Dactylus flattened; occludent margin with a longitudinal carina, shutting into a groove in the thumb, the fingers with a fringe of hairs. Feet of the second pair slender, filiform; ischium and meros equal; carpus five-jointed, first joint as long as second and third, second as fourth and fifth, third and fourth equal, fifth a half longer than preceding. Telson subquadrate; extremity arcuate.

The variations I have observed from the above description are as follows:—In specimens from Florida, I have found the front three spined, the ocular spines, however, being smaller than the rostrum. In a specimen from Nassau, N. P., there is a groove upon the upper margin of the propodus of the larger hand, which at about a median point between the base and the articulation of the dactylus bends and is continued for a

short distance upon the outer surface. The dactylus is also somewhat obliquely articulated.

Three specimens from Florida give the following measurements:—

| Length of body. | Carapax. | Larger hand. |
|--------------------|--------------------|--------------------|
| 30.3 ^{mm} | 11.2 ^{mm} | 17.6 ^{mm} |
| 29.6 | 10.8 | 15.3 |
| 32.5 | 13.8 | 15.0 |

Specimens from Lake Harney, Florida (which is, I am informed by Prof. J. W. P. Jenks, a body of fresh water), are greatly larger than the average:—

| Length of body. | Carapax. | Larger hand. |
|--------------------|--------------------|--------------------|
| 43.7 ^{mm} | 15.0 ^{mm} | 20.5 ^{mm} |
| 42.0 | 15.6 | 25.0 |

I have examined specimens from Fort Macon, N. C. (*Dr. H. C. Yarrow*); Smyrna and Key West, Fla. (*A. S. Packard, jr.*); Bahamas, Bermudas (*G. B. Goode*); Aspinwall (*J. A. McNiel*); Abrolhos, Brazil (*C. F. Hartt*). Specimens brought from Panama by *F. H. Bradley* and from Realigo, west coast of Nicaragua, by *J. A. McNiel*, appear to be the same as the east-coast form. In the Proceedings of the California Academy of Sciences for February 7, 1876, Mr. Lockington describes *Alpheus equidactylus*, the characters of which agree, so far as they go, perfectly with this species; but, owing to the imperfections of his description, I am unable to decide whether they are the same.

ALPHEUS AFFINIS *Kingsley*.

Carapax rather broad, smooth; rostrum acute, separated from the ocular arches by a sulcus; ocular arches produced forward; peduncles of antennulæ hirsute; basal spine extending to second joint; joints of peduncle as in *het. rochelis*. Basal joint of antennæ with spine beneath; basal scale narrower than in *heterochelis*, extending as far forward as peduncle of antennulæ; flagellum as long as body. External maxillipeds hirsute, extending to extremity of basal scale. Meros of first pair triangular; spines on the inner inferior margin. Larger cheliped quite compressed; a constriction on the upper margin, the posterior edge of which extends forward as a spine; a sulcus runs back from this constriction on both the inner and outer surface to behind the middle of the palm; lower margin compressed opposite the constriction in the upper. Dactylus as in *heterochelis*, but obtuse. Smaller hand as in *heterochelis*, but more slender. Carpus of second pair five-jointed; first and second equal, and each as long as the three remaining; third and fourth equal, and each slightly shorter than fifth. Telson slightly tapering; extremity rounded. Panama (*F. H. Bradley*). Seven specimens.

ALPHEUS PARVIMANUS *Kingsley*.

Slender, compressed; rostrum short, acute; basal spine of antennulæ not reaching second joint; basal joints nearly equal, the third being

slightly shorter than the second. Basal joint of antennæ with a minute spine beneath. Antennal scale narrow, reaching slightly beyond antennular peduncle, the spine at the antero-lateral angle reaching beyond the laminate portion, which is small. External maxillipeds slender, extending to the extremity of the antennal scale, the distal portion with long hairs. Meros of first pair rounded-triangular. Hands small, nearly equal; the larger oblong, compressed, smooth, with scattered hairs; a constriction of both margins posterior to the articulation of the dactylus; fingers completely closing; dactylus acute, shutting into a groove in the propodus, as in the case of *A. heterochelis*, the tooth of the inner margin being, however, much less prominent. Smaller hand slender, nearly cylindrical, hirsute, the fingers as long as the palm. Carpus of the second pair five-jointed; first joint as long as the three following, second as long as fourth and fifth, third and fourth equal, and together equalling the last. Meros of posterior pairs without spines beneath. Extremity of telson rounded. Panama (*F. H. Bradley*). Four specimens.

ALPHEUS CYLINDRICUS Kingsley.

Carapax smooth; rostrum very short, obtuse; no orbital spine; first and third joints of antennulæ equal, second twice as long. Flagella of antennulæ and antennæ broken. No spine on basal joint of antennæ. Antennal scale slender, narrow, pointed, the laminate portion being almost obsolete, extending to extremity of second joint of peduncle of antennulæ. External maxillipeds long, extending beyond peduncle of antennæ. Meros of the first pair short, stout, triangular. Larger hand cylindrical, a groove on the outer side below the articulation of the dactylus. Dactylus working horizontally, very short, yet extending beyond the opposable part, two or three teeth on the inner margin, and shutting into a groove in the propodus. Smaller hand cylindrical; fingers as long as palm, equal, slender, curved downward. Carpus of second pair jointed; first joint equalling the following three; second as long as third and fourth, which are equal; fifth a half longer than fourth. Telson narrow, tapering rapidly; extremity truncate.

| Length of body. | Carapax. | Larger propodus. | Dactylus. |
|-----------------|----------|------------------|-----------|
| 19.5mm | 8.0mm | 12.0mm | 3.0mm |

Pearl Island, Bay of Panama (*F. H. Bradley*). One specimen.

ALPHEUS TRANSVERSO-DACTYLUS Kingsley.

Compressed carapax, minutely punctate; front three-spined; basal spine of antennulæ not extending to the second joint of the peduncle; second joint twice as long as the third; inferior branch of flagella twice as long as the superior. Basal joint of antennæ with a spine; antennal scale very narrow, terminating in a strong spine; flagella nearly as long as the body. External maxillipeds extending to the tip of the antennal scale; basal joints with scattered hairs; distal joints thickly

covered. Feet of the first pair large, unequal; larger hand with the outer proximal portion smooth; at about the middle there is a constriction of both margins, connected on the inner surface by a more or less apparent groove. Slightly in advance of these constrictions, the surface is abruptly compressed, two elevated lines running out from the basal portion, the lower terminating in a spine; a spine above the articulation of the dactylus; dactylus articulated to the outer surface of the hand, working horizontally, extending beyond the thumb, fitting for about half its length in a groove in the propodus; dactylus and distal portion of propodus with long hairs. Smaller hand about half the size of the larger, constricted above and below; a spine above the articulation of the dactylus; dactylus articulated in the usual manner, working vertically; inner surface of hand somewhat hairy. Carpus of the second pair five-jointed, first and second joints subequal, and each as long as the fourth and fifth together; third and fourth subequal; fifth slightly longer. Meral joints of the remaining pairs with a spine beneath; propodi spinulose. Telson tapering; extremity rounded.

| Length of body. | Carapax. | Larger hand. |
|-----------------|----------|--------------|
| 21.5mm | 7.7mm | 10.2mm |
| 14.0 | 5.1 | 8.8 |

Santa Barbara and San Diego, Cal. (*W. G. W. Harford*), seven specimens. I cannot separate from this two specimens from the Bermudas, one collected by *J. M. Jones* and the other by *G. Brown Goode*.

ALPHEUS CLAMATOR Lockington.

Alpheus clamator Lockington, Proceedings California Academy of Science, March 20, 1876.

The following description is drawn from a single imperfect specimen in the museum of the Peabody Academy of Science, which I refer to this species.

Basal spine of antennulæ stout, short, not reaching second joint of peduncle; third joint half as long as preceding. Antennæ without spine on the basal joint. Antennal scale narrow, the spine at the antero-exterior angle acute, slender, reaching the end of the antennular peduncle. External maxillipeds rather broad, extending slightly beyond the antennal scale. Feet of the first pair unequal. Meros smooth, with a very slender spine on the distal portion above. Larger hand compressed, a constriction of each margin at about the middle, a spine above the articulation of the dactylus, behind which a sulcus runs obliquely across the superior margin. A second spine on the outside; thumb slender; dactylus compressed, semicircular in outline viewed from the side, slightly longer than the thumb. Smaller hand with both margins constricted; upper margin of palm tuberculate; a spine above the articulation of the dactylus; fingers about equal to the palm, completely closing. Ischium and meros of second pair equal; carpus five-jointed, first two joints equal, and each as long as the third and fourth, which are

also equal; fifth joint nearly as long as the first. Meros joints of posterior pairs without spines; propodal joints spinulose beneath; dactyli slender. Santa Barbara, Cal. (*W. G. W. Harford*).

From the description of Mr. Lockington, I get the following additional characters, not afforded by my imperfect specimen:—Front three-spined; the rostrum slender, longer than, and separated from, the ocular spines by a deep sulcus. Flagella of antennulæ about half as long and of antennæ three-fourths as long as the body.

ALPHEUS LONGIDACTYLUS *Kingsley*.

Betaxus longidactylus, Lockington, *l. c.* Feb. 7, 1876.

Compressed; carapax smooth; front rounded; rostrum and ocular spines wanting; antennular spines slender, acute. First and second antennular joints subequal, third shorter; inner flagellum three-fourths the length of carapax, outer? Antennal scales shorter than peduncles of either pair of antennæ. External maxillipeds extending nearly to extremity of antennal peduncle. Hands of the first pair equal, slender, inverted; dactylus slightly longer than palm, with a few teeth on the dactylus at the base. Pincer gaping, a single tooth on the thumb near the palm; fingers both pointed. Carpus of second pair five-jointed; first joint as long as the three following; second, third, and fourth equal; fifth slightly longer. Extremity of telson rounded.

| Length of body. | Of carapax. | Of hand. |
|-----------------|-------------|----------|
| 35.0mm | 12.0mm | |
| | 8.0 | 7.0mm |

San Diego, Cal. (*Henry Hemphill*); two dry, imperfect specimens.

ALPHEUS HARFORDI *Kingsley*.

Carapax smooth; rostrum wanting, the front being emarginate between the eyes. Basal scale of antennulæ spiniform, very long and slender, extending forward as far as the middle of second joint and slightly incurved. Second joint of peduncle three times as long as last joint. Outer branch of flagellum about one-half and inner about two-thirds the length of carapax. Antennæ without a spine on the basal joint; antennal scale with the spine long and slender, the laminate portion being quite small. Flagellum about two-thirds the length of body. Meros of first pair trigonal, with a small spine at upper distal angle. Larger chela compressed-ovate, smooth, without corrugations or constrictions; pollex with a notch furnished with two or three small teeth near the articulation of the dactylus; dactylus slender, extending beyond the opposite finger, a notch similar and opposite to that on the thumb; the dactylus is articulated to the inferior margin of the propodus. Smaller hand not greatly differing from the larger, but more slender, and the fingers without any notch. Feet of second pair slender; ischium slightly shorter than meros; carpus five-jointed, the first as long as the three succeeding ones; second, third, and fourth equal; the

fifth slightly longer; chela about as long as the two preceding joints. Telson slender, tapering; extremity regularly rounded.

This species differs from the description of *Betaxus equimanus* Lockington in having the peduncles of antennæ and antennulæ nearly equal, the relative lengths of the antennular flagella, and the shape of the fingers of the larger hand, which are not straight on the occludent margin.

Santa Barbara, Cal. (*W. G. W. Harford*), 4 specimens. Catalina Island, Cal. (*W. G. W. Harford*), 3 specimens; under the mouth of *Haliotis rufescens* Swains.

| Length of body. | Carapax. | Larger hand. | Larger dactylus. |
|-----------------|----------|--------------|------------------|
| 24.0mm | 8.0mm | 8.0mm | 4.7mm |
| 19.0 | 6.0 | 6.0 | 3.6 |

Of the following species I have not seen specimens:—

Alpheus bellimanus, Lockington, *l. c.* Feb. 7, 1876.

This appears to be near the *transversus* of this paper. Lockington's specimens came from San Diego, Cal.

Alpheus equidactylus, Lockington, *l. c.* Feb. 7, 1876.

From Monterey, Cal. The extremely short description applies perfectly to *A. heterochelis*.

Alpheus bispinosus, Streets, Proc. Phila. Acad. Nat. Sci. 1872, 242.

The description applies very well to *A. heterochelis*. The specimens came from the Isthmus of Panama, but from which coast is not known.

ALPHEUS ÆQUALIS *Kingsley*.

Betaxus equimanus (nom. præoc.), Lockington, *l. c.* Mar. 20, 1876.

Appears to be near the *Alpheus harfordi* described above. If it prove distinct, it will stand as *æqualis*, as the name *equimanus* has been used by Dana.

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