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FALCO POLYAGRUS (Cassin). (Prairie Falcon.)

This egg, as might be expected, closely resembles that of *jugger*, and was found by my correspondent Mr. L. E. Rickey at the head of Echo Cañon, in Watsatch Mountains, Utah, E. May 23, 1868. He writes me :---

"The nest was placed in a niche at the top of an isolated about 20 feet high; and had evidently been used by the same of a some other pair of birds for a number of years; as it had been appearance of old Crows' and Hawks' nests. It was much flatter and the materials were earth and sticks. It contained four which were nearly fresh, incubation having barely commenced all altitude of the Cañon at the place where the nest was located in a 6500 feet above the level of the sea; and the weather even in the late date had not become settled, snow-squalls being of frequencies.

"I spent the whole summer of 1871 near this place, and I belie to we had some frost during every month. I saw both the parent brok and secured the male, which I forwarded to the Smithsonian Tests tution; and Professor Baird told me it was the first adult male skin he had received."

ELANOÏDES FURCATUS (Linn.). (Swallow-tail Kite.)

Of this species I have the pleasure of exhibiting seven eggs takin from four different nests. They were collected in Black-Hawi County, in the State of Iowa, U. S. A.; and my correspondent aforms me that in that locality the eggs are found from May 22ad to June Sth; and, so far as his experience tells him, the complement of eggs is always two.

The nests are built of sticks and moss, and are generally placed in high trees.

ICTINIA MISSISSIPPIENSIS (Wilson). (Mississippi Kitel)

This rare egg was collected by one of the correspondents of the Smithsonian Institution, Washington, U. S. A. The nest, composed of only a few sticks, contained two eggs, and was found on the 122 of June in a tree about 15 feet high; and one of the parents was secured.

11. Contributions to a General History of the Spongiade By J. S. BOWERBANK, LL.D., F.R.S., &c.-Part LIV

> [Received April 11, 1872.] (Plates XLVI.-XLIX.)

GEODIA TUBERCULOSA, Bowerbank. (Plate XLVI.)

Sponge massive, sessile, somewhat cup-shaped. Surface about ing in large tubercular prominences; furnished abundantly with

ternal defensive spicula: primary series large and long acerate spicula, usually obsolete; secondary series acerate, minute. Oscula simple, small, and numerous, usually congregated in deep cavities. Pores congregated in minute areas; porous areas conspicuous, very numerous. Dermal crust rather thin, composed of small globose ovaria. Dermal membrane thin and pellucid, abounding with minute cylindro-stellate spicula, rarely subsphero-stellate; radii numerous. Skeleton-spicula fusiformi-acerate, rarely acuate, large and long; connecting spicula patento-ternate, stout, terminations of the radii occasionally recurved; and also with numerous slender recurvoternate, and rarely with porrecto-ternate, or spiculated porrectoternate spicula. Interstitial membranes-tension-spicula acerate, slender, few in number. Retentive spicula attenuato-stellate, comparatively large, and very numerous; radii few in number, and frequently incipiently spinous, and rarely with large cylindro-spherostellate spicula with radii apically spinous. Ovaria spherical, rather small and very numerous.

Colour in the dried state crenm-white. Hab.' Mexico (Mr. Thomas Ingall). Examined in the dried state.

The exterior form of the specimen is very like that of the large Neptune's-cup sponge with the interior space nearly filled up to the brim. It is $5\frac{1}{4}$ inches in height, and its greatest diameter is about 4 inches. It has no apparent base, but has evidently been supported by several points of attachment to the stems of small fuci or zoophytes, amidst which it has been developed. The external surface is very irregular, being covered with large irregular nodular projections nearly an inch in height, and from half to three fourths of an inch in diameter. There are several deep indentations or pits in its substance; and the terminations of two of these on opposite sides of the sponge have met and formed a passage completely through it. Within these deep indents the oscula appear to be congregated; and there are also a considerable number of them on one side within the terminal cup of the sponge. The greater portion of the surface of the sponge is denuded of the large primary series of defensive spicula; but in one of the deep indentations they remain in situ; and on a large portion of the thick rim of the cup they are present, crushed down into a compact layer, intermingled with confervoid vegetation, to which it is most probable we are indebted for their preservation on that portion of the sponge. That the whole of the external surface has been armed with these large spicula is amply proved by their basal portions remaining imbedded in every part of the crustular dermis that has been examined under the microscope. The secondary series of external defensive spicula are imbedded near the outer surface of the dermal crust, their distal points projecting numerously, but to a very short distance, beyond the dermal membrane. The porous areas are abundant on the greater portion of the exterior surface of the sponge; to the unassisted eye they appear like a series of impressions made by the point

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of a pin. The dermal crust rarely exceeds about one fourth or one third of a line in thickness. The retentive spicula of the derma membrane are very minute, and require a microscopical power at about 700 linear to clearly demonstrate their forms. Their greates diameters from opposite points of their radii is not more than about one sixth or one fifth of that of one of the skeleton-spicula. They are exceedingly numerous, and in many parts of the membrane verclosely packed together.

The similar description of spicula on the interstitial membranes are very distinct in size and structure from those of the dermal membrane; their extreme diameters from opposite points of thour radii average about two thirds of that of a large skeleton spicule the radii are few in number and gradually attenuate to a sharp point. When examined with a microscopical power of about 700 linear the radii generally exhibit traces of incipient spination. These spicule are very numerous, and some parts of the membrane are crowded with them.

The large cylindro-sphero-stellate spicula are sparingly intermixed with those of the interstitial membranes; they are much longer and stouter in their structure, some of them being nearly as large as an average-sized ovarium. The apices of their radii terminate hemispherically, and they are profusely covered with large conical spines. These spicula are very characteristic of the species. I do not receilect having seen the same form before in any species of *Geodia*.

GEODIA TUMULOSA, Bowerbank. (Plate XLVII.)

Sponge massive, sessile, tumulous. Oscula congregated in shallow depressions on the apices of the tumulous projections, simple, numerous. Pores—congregated porous areas conspicuous, very numerous pores inconspicuous, few in number in each area. Dermis crustaceous, thick, densely crowded with ovaria; dermal membrane pelluoid thin, crowded with very minute cylindro-subsphero-stellate spicula tension-spicula acerate, minute, few in number. Connecting spicula attenuato-patento-ternate, large and stout, not very numerous Skeleton—fasciculi polyspiculous; spicula fusiformi-acerate, large and stout. Interstitial membranes—tension-spicula acerate, small and few in number; retentive spicula attenuato-stellate, rather large very numerous and very minute, few in number. Ovaria spherical slightly depressed, very abundant in the crustaceous dermis, and numerously dispersed on the interstitial membranes.

Colour in the dried state light ochreous yellow. *Hab.* Honduras (*Mr. Dyson*); Jamaica (*Mr. Gosse*). Examined in the dried state.

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The figure represents the upper surface of the specimen 1 obtained from Mr. Dyson, who found it at Honduras. Its greatest thickness is $2\frac{3}{4}$ inches. Portions of its surface are thinly coated by a parasitical halichondroid sponge, and especially the underside of it. It was originally based on the valves of a dead *Pecturollus*, which is still attached to its under surface, in which it is partie



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imbedded. The specimen from Jamaica is rather larger than the type one; it is $8\frac{1}{2}$ inches in length by $4\frac{1}{2}$ inches in breadth. The two specimens are very similar in all their external characters; there is only this difference in their condition-that while in the type specimen nearly all the oscula in the sunken areas on the tumuloid bodies are open, in the specimen from Jamaica the greater number of them are closed, and it is only in two or three of the smaller groups that they are open, and exhibit precisely the same characters as those in the Honduras specimen. Both specimens are more or less covered with thin light-brown parasitical Isodictyas, and especially on their under surfaces. There are none of the oscular areas on the underside of either of the two specimens; nor could I detect a single osculum on any other part of the specimens than those within their proper boundaries. The porous areas are visible to the unassisted eye; they are very numerous, and closely adjoining each other. In a thin slice from the dermal surface, mounted in Canada balsam and viewed with a power of 180 linear, they were very distinctly exhibited. Each porous area was furnished with a thin and very pellucid membrane, on which was dispersed an innumerable quantity of exceedingly minute cylindro-subsphero-stellate-spicula, and a few very slender acerate tension ones. The pores in the greater number of the areas were closed; in a few they were open, and in these their number did not exceed four or five; when in a closed condition their positions were frequently indicated by minute circular areas destitute of the surrounding minute stellate spicula.

The dermal crust of the sponge is very thick; it is composed of an infinite number of fully developed ovarian bodies closely packed together. The whole of them appeared of uniform density. The external dermal membrane was crowded with closely packed very minute attenuato-stellate spicula, with a few small acerate tension ones.

The ternate apices of the fully developed connecting spicula are cemented firmly to the inner surface of the dermal crust; and their shafts descend amidst the distal ends of the skeleton-fasciculi. The greater number are purely ternate; but occasionally one or more of. their radii become furcated. At a short distance beneath the crustaceous dermis, imbedded amidst the skeleton-fasciculi, a few young ternate spicula may frequently be seen in an incomplete state of development, as if in reserve, to be brought forward if necessary for the support of the crustaceous dermis.

The skeleton-fasciculi are rather irregularly disposed, but they always, more or less directly, radiate in lines from the centre of the sponge, or of the projecting parts of it, to the surface. The interstitial membranes are furnished with the same description of small acerate tension-spicula that are found in the dermal membrane, and, as in that organ, they are few in number. The retentive spicula are different from the very minute ones that abound in the dermal membrane. They are the same description of spiculum, but very much larger, and have much fewer radii, and they are very long and acute. The interstitial membranes abound also with ovarian bodies in all

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stages of development. In their earliest state they appear as sme smooth spheres imbedded in a thick coat of gelatinoid sarcode, and in this condition the ovary measured $\frac{1}{1764}$ inch in diameter the next stage the diameter is considerably increased, and the interval ovary is furnished with numerous long and acutely pointed spice and every gradation of its development may be traced until it attained maturity. As it progresses in development the spicula appear and become shorter and stouter, until in its fully developed and on hausted state their distal ends are all cemented into a continueus smooth mass, every distal termination having a completely truncated appearance, and the whole mass having become as solid as a minute sphere of glass. In this condition an average-sized one measured $T_{a,\pi}^{1}$ inch in diameter. The greater portion of these organs in the dermal crust are in the solid and exhausted state; but on the external surface of the dermal crust there were many of them contains ing spherical masses of ova varying in size from about one fifth to half the diameter of the ovary, and of a jet-black colour, and on some of them I observed small patches of these exceedingly minute ova spread over the surface of the ovaria, as if they had been just ejected from those bodies at the time when the sponge was taken from the sea.

PACHYMATISMA AREOLATA, Bowerbank. (Plate XLVIII.)

Sponge massive, sessile, parasitical (?); surface uneven, full of large deep areas or depressions. Oscula minute, numerous, congregated in the deep areas of the surface. Pores inconspicuous. Dermis crustular, rather thick, filled with ovaria; furnished rather sparing is with large acerate or acuate primary external defensive spicula, and abundantly with small fusiformi-acerate secondary external detensive spicula. Dermal membrane pellucid, furnished sparingly with small fusiformi-acerate tension spicula; and abundantly with very minute and short fusiformi-cylindrical incipiently-spined retentive spicula and sparingly with large and small attenuato-stellate spicula. She leton-rete open and strong, entirely irregular; spicula large, fust formi-acerate, rarely acnate. Connecting spicula attenuato-patentoternate, large and strong, few in number. Interstitial membranes -tension-spicula small, fusiformi-acerate, like those of the dermal membrane, few in number. Retentive spicula the same as those of the dermal membrane, very numerous. Ovaria subspherical, sligner depressed; reticulations of surface minute and delicate.

Colour in the dried state cream-white. Hab. The Red Sea (Mr. Hugh Cuming). Examined in the dried state.

I obtained this sponge from the late Mr. Hugh Cuming, who received it, with other specimens of natural history, from the Red Ser. It is a depressed mass of an irregular elongate-ovate form, / inches in length, 33 inches in width, and 23 inches at its greatest thickness. There is no basal attachment apparent, and it has every appearance of having been unattached at the bottom of the sea for a consider



Pachvmatisma areolate

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able period. That which has apparently been its upper surface, under these circumstances, is crowded with large irregularly shaped depressed oscular areas, exceeding sixteen in number, and varying in diameter from half an inch to an inch and half, the elevated ridges intervening rarely exceeding a quarter of an inch in thickness, the areas varying from one to six lines in depth. On that which has apparently been the lower side of the sponge there are shallow indications of a few such areas; but the whole of this surface otherwise is smooth and even compared with the upper one. The greater portion of the surface is denuded of its large external defensive spicula; but on the under surface there is a triangular space equal to somewhat more than a superficial square inch on which they are in excellent preservation, intermingled with numerous spicula of the secondary series of defensive spicula, all compressed and matted together on the surface; and in several of the oscular areas on the upper surface the secondary series of external defensive spicula are exceedingly numerous in situ and in their natural positions, and are so abundant as to completely obscure those organs, like thick tufts of wetted hairs.

The oscula in each area are very numerous and closely adjoining each other, and, as might therefore be expected, are very minute, and are not visible until denuded of the secondary external defensive spicula.

The pores are dispersed over all parts of the sponge not occupied by the oscular areas; they*are very minute, and are scarcely visible with the aid of a lens of an inch focus.

The dermal and interstitial membranes have but few comparatively of the fusiform tension-spicula, which are of the same form and of about the same size as those of the external secondary series of defensive spicula; but both descriptions of membranes abound with the minute short fusiformi-cylindrical incipiently spined retentive spicula. These organs are exceedingly interesting, and very characteristic of the species. They are irregular in their forms and proportions; but when well developed they are about three times, the length of their greatest diameter, and their length, as compared with the diameter of a full-sized skeleton spiculum, is as about one to eight. They are so minute as to require a microscopical power of about 800 linear to define their form and spination distinctly. In some parts of the membranes they are so numerous as to entirely obscure the tissues beneath them.

The attenuato-stellate retentive spicula of the interstitial membranes are variable in size, ranging in extreme diameter (from opposite points of their radii) from one fourth to about one third of the diameter of an adult skeleton-spiculum. The radii of the larger ones are few in number and frequently incipiently spinous; comparatively speaking, they are not very numerous. The large fusiformiacerate spicula of the primary external defensive system are few in number; but, to compensate for their comparative scarcity, those of the secondary system of defensive spicula are exceedingly numerous, and especially so in the large shallow oscular areas. They are pro-

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jected beyond the present surface for about half their own length The network of the skeleton is completely irregular, even imme diately beneath the inner surface of the crustular dermis; and consequence of the great size of the spicula of which it is composed the network is large and open. The spicula are all more or less fusiform, and their apices rather bluntly terminated, so much so in some cases as to almost entitle them to be designated as fusiforming cylindrical. A few large acuate spicula occur intermixed with them The connecting spicula correspond in size with those of the ske leton; they are very few in number; some of them have their large ternate apices so deeply imbedded in the crustular mass as to be nearer to its outer surface than to its inner one; but the greater number occupy their usual positions, in close adhesion to the inner surface of the crustular dermis. The component spicula of the ovaria are more than usually delicate in structure, the outer surface. of the organ having its reticulations very minute. They are exceedingly abundant in their mature form in the dermal crust : and in the interstitial membranes beneath they may be found in every imaginable stage of development. When seen sideways they appear somewhat oval in consequence of their being slightly depressed but when viewed with the foramen upward, or directly beneath, they present a regular circular form.

At the first view this species may be readily mistaken for a Geodia, but a microscopical section at right angles to its surface immediately removes the false impression.

HYMENIACIDON ANGULATA, Bowerbank. (Plate XLIX.)

Sponge sessile, coating; surface smooth but very uneven, coriaceous. Oscula simple, large, and very numerous. Dermis coriaceous; dermal membrane spiculous, spicula arranged in more or less flat fan-shaped fasciculi, ovo-spinulate, long and slender. Defensive spicula spinulo-multiangulated cylindrical, very variable in size and form, few in number, very minute. Skeleton densely crowded with spicula; spicula ovo-spinulate, variable in size and structure.

Colour in the dried state dark ochreous yellow. Hab. Madeira (Dr. Nathaniel Lister). Examined in the dried state.

I received eight specimens of this species from Dr. Nathaniel Lister of Madeira, who found them on the rocks at near low-water mark. The largest was 12 inches long, by $7\frac{1}{2}$ inches greatest breadth and $2\frac{1}{2}$ inches thick; the smallest one was $4\frac{1}{2}$ by $3\frac{1}{2}$ inches, and $1\frac{1}{2}$ inch in thickness. The whole of them agreed very closely im their external characters. In the dried state their surfaces are very uneven, apparently from the effects of contraction in drying.

The oscula are exceedingly numerous and very large; and in one case fully open they measured 8 lines in diameter. In the greater number of the specimens they were mostly closed; but in one the whole of them were open to their fullest extent, giving to the sponge an appearance closely approximating to that of a mass of irregularly 1872.

constructed honeycomb. On applying to Dr. Lister for an explanation of this exceptional condition of the specimen, he stated that the specimens in which the oscula were closed were taken from the sea and dried immediately in a shaded place, and that the one in which they were all open was placed about half an hour after removal from the sea in a basin with sea-water sufficient to entirely cover it and was left exposed to the sun. When thus placed, nearly all the oscula were closed; and it was observed by Dr. and Mrs. Lister that a gradual contraction of the closing membranes very shortly commenced, which continued until the whole of the oscula were open to their greatest extent; and in this condition they re-Dr. Lister also stated that when attached to the rock and mained. undisturbed the oscula were most frequently open, but that if disturbed by being removed from the rock they immediately contracted slowly and became entirely closed. We are familiar with this description of action in Hymeniacidon celata and other species of sponges; but there is no one with which I am acquainted that exhibits this vital action on so extended and striking a scale as the species under consideration.

The dermis has a strikingly coriaceous appearance. The dermal membrane is thin and pellucid, and is abundantly supplied with long and slender ovo-spinulate spicula more or less arranged in broad flat fan-shaped fasciculi, in which the bases are all coincident and the apices radiating. There is no difference in size between these spicula and those of the skeleton. The most distinctive character in this species is undoubtedly the very minute but remarkable spinulomultiangulated cylindrical defensive spicula of the dermal membrane, represented by figure 7, Plate XLIX, It requires great care to obtain these spicula from portions of the dermis by the aid of dissolution of the sponge in boiling nitric acid, but they may be readily seen in situ in a thin slice of the dermis, mounted in Canada balsam, with a power of 600 or 700 linear. This is the only case in which I have found this singular form of spiculum in situ. The one figured represents the normal form in a fully developed condition; and in such spicula the central canal can frequently be seen. A great number of them are distorted to a very considerable extent; and some are exceedingly attenuated and have the spines very incompletely developed.

The spicula of the skeleton are crowded together on the interstitial membranes without the slightest approximation to order. They are very variable in size, some of them being twice the diameter and length of others; and the ovo-spinulation is equally variable, some of the basal inflations being completely spherical, while others assume every possible variation of the ovoid form.

This species of sponge is interesting, not only on account of the remarkable development of its oscula and their vital powers of action, but also as affording the type form *in situ* of the spiculum represented in plate iii. fig. 72, vol. i. 'Monograph of British Spongiadæ,' in treating of the anatomy and physiology of the spicula.

DESCRIPTION OF THE PLATES.

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PLATE XLVI.

Fig.	1.	The	type	specim	en of	Geodra	<i>tuberculosa</i> , mata skeleto	Bowerban	k, natural	8120
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- This figure also represents a large primary external defensive spiculum
- Fig. 3. A secondary external defensive spiculum, magnified 80 linear.
- Fig. 4. One of the patento-ternate connecting spicula of the normal form main nifed 80 linear.
- Fig. 5. A large and very fully developed patento-ternate connecting, specifium with the distal terminations of the radii recurved, magnified 80 lines.
- Fig. 6. Δ recurvo-ternate spiculum from immediately beneath the dermal orac magnified 80 linear.
- Fig. 7. A porrecto-ternate spiculum from a short distance beneath the dormal crust, magnified 80 linear.
- Fig. 8. One of the minute subsphero-cylindro-stellate spicula from the derma membrane, magnified 530 linear.
- Fig. 9. One of the slender accrate tension-spicula of the interstitial membranes magnified 80 linear.
- Fig. 10. One of the comparatively large attenuato-stellate retentive spioula of the interstitial membranes, magnified 530 linear.
- Fig. 11. A large cylindro-stellate spiculum with radii spinous, magnified 580 linear. These spicula are very few in number.

PLATE XLVII.

- Fig. 1. The type specimen of Geodia tumulosa from Honduras, natural size
- Fig. 2. One of the slender acerate tension-spicula from the porous areas, magnified 80 linear.
- Fig. 3. A minute cylindro-subsphero-stellate spiculum from a porous area magnified 530 linear. These spicula vary to a considerable degree in size and completeness of dovelopment; the one figured is a meture one.
- Fig. 4. A fully developed attenuato-patento-ternate connecting spiculum; magnified 80 linear.
- Fig. 5. An attenuato-patento-ternate connecting spiculum in an early stage of development, magnified 80 linear.

Fig. 6. A fusiformi-acerate skeleton-spiculum, magnified 80 linear.

- Fig. 7. One of the tension-spicula from the interstitial membranes, magnified S0 linear.
- Fig. 8. One of the comparatively large attenuato-stellate retentive spicula of the interstitial membranes, magnified 530 linear.

PLATE XLVIII.

- Fig. 1. The type specimen of Pachymatisma arcolata. Bowerbank, natural size.
- Fig. 2. One of the large external defensive spicula, magnified 80 linear. This form also occurs to a great extent in the skeleton.
- Fig. 3. An external defensive spiculum of the secondary series from the derma surface, magnified 80 linear. These spicula vary to some extent in size and form.
- Fig. 4. A skeleton fusiformi-acerate spiculum with very blunt terminations, magnified 80 linear. These spicula vary in their terminations in every degree between figs. 2 and 4.
- Fig. 5. One of the large attenuato-stellate retentive spicula of the dermal membrane, magnified 530 linear.
- Fig. 6. A fusiformi-cylindrical, incipiently spined minute sphero-stellate retentive spiculum from the dermal membrane, magnified 530 linear.

1872.] THE SECRETARY ON ADDITIONS TO THE MENAGERIE. 635

PLATE XLIX.

Fig. 1. The type specimen of Hymeniacidon angulata, Bowerbank, natural size.

- Fig. 2. A spiculum from one of the fan-shaped groups of the dermal membrane, magnified 150 linear. These spicula vary from the purely spinulate form to the fusiformi-spinulate one of the figure.
- Fig. 3. An average-sized ovo-spinulate skeleton-spiculum of about the normal form, magnified 150 linear.
- Figs. 4, 5, 6. Varieties of form of the spinulation of the skeleton-spicula, magnified 530 linear.
- Fig. 7. Represents an adult and fully developed spinulo-multiangulated cylindrical defensive spiculum from the dermal membrane, magnified 660 linear.

May 21, 1872.

Robert Hudson, Esq., F.R.S., V.P. in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of April 1872.

The total number of registered additions to the Society's Menagerie during the month of April was 131, of which 10 were by birth, 32 by presentation, 77 by purchase, 2 by exchange, and 10 were received on deposit.

The most remarkable of the acquisitions were :---

1. A Red-bellied Flying Squirrel (*Pteromys magnificus*, Hodgson : Jerdon, Mamm. of India, p. 177), purchased April 10th, of a soldier, who informed us that he obtained it at Donglee (qu. Tonglee) gulley in the Himalayas. Mr. Berjeau's sketch (Plate L.) will give an idea of the form of this fine species of *Pteromys*, which is quite new to the collection.

2. A young female Baird's Tapir (*Tapirus bairdi*), purchased April 15th, having been brought by one of the Society's correspondents from Corinto, on the western coast of Nicaragua.

This animal, although not by any means full-grown, has nearly lost the spots of immaturity which distinguished our former specimen of this interesting species, received in August last*; and as it also differs from the adult as figured by Dr. Gray (P. Z. S. 1867, pl. xliii.), I have thought it advisable to have a careful figure made of it (Plate LI.).

It stands about 23 inches in height, and is 42 inches long, from the extended snout to the rump. Above it is rather thickly covered with brownish-black hairs of about $\frac{3}{4}$ inch in length. The face is rather paler. The ears, except for a portion of their outer rims, are distinctly margined with clear white. The throat and chest are of a sordid white.

The present dentition of this animal consists of six well-developed incisors above, and six below; and two upper canines appear to have

* See P. Z. S. 1871, p. 626, pl. 50.

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