Tails of Rats and Mice

It is, I believe, pretty generally supposed that rats and mice use their tails for feeding purposes in cases where the food to be eaten is contained in vessels too narrow to admit the entire body of the animal. I am not aware, however, that the truth of this supposition has ever been actually tested by any trustworthy person, and so think that the following simple experiments are worth publishing.

Having obtained a couple of tall-shaped preserve bottles with rather short and narrow necks, I filled them to within three inches of the top with red currant jelly which had only half stiffened. I covered the bottles with bladder in the ordinary way, and then stood them in a place frequented by rats. Next morning the bladder covering each of the bottles had a small hole gnawed through it, and the level of the jelly was reduced in both bottles to the same extent. Now, as this extent corresponded to about the length of a rat's tail if inserted at the hole in the bladder, and as this hole was not much more than just large enough to admit the root of this organ, I do not see that any further evidence is required to prove the manner in which the rats obtained the jelly, viz., by repeatedly introducing their tails into the viscid matter, and as repeatedly licking them clean.

However, to put the question quite beyond doubt, I refilled the bottles to the extent of half an inch above the jelly level left by the rats, and having placed a circle of moist paper upon each of the jelly surfaces, covered the bottles with bladder as before. I now left the bottles in a place where there were no rats or mice, until a good crop of mould had grown upon one of the moistened pieces of paper. The bottle containing this crop of mould I then transferred to the place where the rats were numerous. Next morning the bladder had again been eaten through at one edge, and upon the mould there were numerous and distinct tracings of the rats' tails, resembling marks made with the top of a penholder. These tracings were evidently caused by the animals sweeping their tails about in the fruitless endeavour to find a hole in the circle of paper which covered the jelly.

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NEWCOMB ON THE URANIAN AND NEPTUNIAN SYSTEMS.

When the 26-inch equatorial, with an object-glass "nearly perfect in figure," was mounted at the United States Naval Observatory, Washington, it was resolved that its great powers should be first devoted to systematic observations of the satellites of the exterior planets, with the view not only to the better determination of the elements of their orbits, but, more especially, of the masses of their primaries; previous attempts in this direction, from the great difficulties attending observations, having led to very discordant values. Accordingly all the minor arrangements of the instrument were completed with this particular object in view, and no other regular work of dissimilar character was attempted while the satellite-observations were in progress.

In the memoir (Washington Observations, 1873, Appendix I.) to which allusion was made in this column last week, Professor Newcomb describes generally his method of observation; and with respect to his measures of the inner satellites of Uranus, which he thinks may fairly be regarded as the most difficult well-known objects in the heavens, he expresses surprise at the degree of precision with which he was able to bisect them with the faintly-illuminated wire of the micrometer, an examination of the individual measures having shown that they were not more discordant than those of the outer satellites.

In discussing the observations of the satellites of Uranus, extending from January 1874 to May 1875, circular elements are assumed for the formation of equations of condition, and by the usual methods elliptical orbits are obtained for each satellite; but it results that there is but slight evidence of any real excentricity of the orbits, and none whatever of any mutual inclination. Circular elements derived similarly are retained, and Tables for the ready prediction of the positions of the satellites which are most essential for their certain observation are founded upon them, and appended to Prof. Newcomb's memoir. The most probable mean plane of the orbits is found to have the following elements:—

Ascending node on earth's equator ... $165°·10 + 1°·43\ (t-1850)$
Inclination ... ... $75°·14 - 0°·14\ (t-1850)$

Or, as referred to the ecliptic,

Ascending node ... ... $165°·48 + 1°·40\ (t-1850)$
Inclination ... ... $97°·85 - 0·013\ (t-1850)$

(The motion of the satellites of Uranus is direct upon the equator, but retrograde when referred to the ecliptic.)

Other elements are:—

	Mean Longitude	Radius of orbit.	Period of Revolution. Days.
Ariel	21°·83	13″·78	2·52038
Umbriel	136°·52	19″·20	4·14418
Titania	229°·93	31″·48	8·70590
Oberon	154°·83	42″·10	13·46327

Mean noon at Washington, 1871, December 31, is taken for the epoch of mean longitude, which is reckoned from the point where the orbit intersects the plane parallel to the earth's equator and passing through the centre of the planet. The arc values of radii of orbits are for the distance [1·28310]. If we assume the mean solar parallax, 8″·875, and adopt Clarke's equatorial semi-diameter of the earth, we find from these values the following distances of the satellites from Uranus, expressed in English miles.

Ariel	118,100	Titania	269,800
Umbriel	164,550	Oberon	360,800

It may be mentioned that Sir W. Herschel's observations between the years 1787 and 1798 are brought to bear upon the determination of the periods of Oberon and Titania.

For reasons which are given, Prof. Newcomb thinks it "extremely improbable that the masses of the satellites exceed $\frac{1}{15000}$ of that of the planet," in which case the Uranocentric perturbations due to mutual action will be "incapable of detection with any instrumental means yet known." He mentions that, seen with the 26-inch telescope, the brighter satellites, Titania and Oberon, shine with about the brilliancy of a fourth magnitude star to a single unassisted eye.

We must not omit to state that the discovery of the inner satellites, Ariel and Umbriel, is distinctly assigned by Prof. Newcomb to Mr. Lassell; indeed, there appears every reason for believing that these excessively minute objects have not yet been recognised with any instruments except the Washington refractor and the reflectors which Mr. Lassell has constructed: the discovery of these satellites may be dated from the definitive announcement made by Mr. Lassell to the Royal Astronomical Society in November 1851. Prof. Newcomb remarks that "where any difficulty whatever is found in seeing the outer satellites," he would not hesitate to pronounce it impossible to see the inner ones, and thus it is not likely that the Bothkamp and other observations can have referred to the latter.

Though no systematic search was made for additiona- satellites, Prof. Newcomb believes "he may say with considerable certainty that no satellite within 2′ of the planet and outside of Oberon, having one-third the brilliancy of the latter, and therefore that none of Sir William Herschel's supposed outer satellites can have any real existence."

In the Washington refractor the planet has always presented a sea-green colour, no variations of tint being ever noticed. Markings upon the disc were not especially looked for, but if any had been visible they would hardly have escaped remark.

The observations of the satellite of Neptune are treated in a very similar manner to those of the satellites of Uranus. No certain amount of ellipticity is exhibited, and circular elements are accordingly used in the formation of tables for the prediction of the positions of the satellite. For the epoch 1873, December 31, Washington mean noon, the mean longitude of the satellite, reckoned from the intersection of the orbit with the plane parallel to the earth's equator, and passing through the centre of the planet, was 98°·96; the node on equator, 183°·03, and the inclination, 121°·7. The radius of the orbit at the mean distance of Neptune [1·47814] is found to be 16″·275, or 218,550 miles. The mean motion assumed at the commencement of the discussion was that founded upon the observations of Mr. Lassell (Hind, "Monthly Notices," vol. xv.), and does not appear to admit of any sensible correction. Prof. Newcomb thinks the motion of mean longitude is correct within 2° or 3° a century. The period of revolution of the satellite is 5·8769 days.

No trace of a second satellite of Neptune has ever been seen, though it has been looked for carefully on several occasions.

The conclusion to which Prof. Newcomb's investigations have led, "that the orbits of all the satellites of the two outer planets are less excentric than those of the planets of our system, and that, so far as observations have yet shown, they may be perfect circles," will appear a remarkable one.

We take this opportunity of presenting the elements of the orbits of Uranus and Neptune adopted in the Tables of Prof. Newcomb, as perhaps an acceptable addition to the preceding outline of his researches on the satellites of these planets. The values of the major axes here given are not those which would result from the mean motion with correction for the mass, but in the case of Uranus include a constant term in the perturbations of the radius vector, and in that of Neptune, constants introduced by the action of the planets, and effect of secular variation of the longitude of the epoch:—

	URANUS.	NEPTUNE.
Mean longitude, 1850 Jan. 0·0 G.M.T.	28° 25′ 17″·1	335° 5′ 38″·9
Longitude of perihelion	168 15 6·7	43 17 30·3
Ascending node	73 14 8·0	130 7 31·9
Inclination	0 46 20·5	1 47 0·6
Excentricity	0·0469236	0·0084962
Mean motion in the Julian year	15425″·75	7864″·935
Semi-axis major	19·19130	30·07055
Period in days	30686·63	60186·64

CASSOWARIES

LIKE the minor planets, Cassowaries are of late years continually increasing in number. A short time ago there was but one "Cassowary" recognised by naturalists, which was vaguely stated to inhabit "the Moluccas." Even Mr. Wallace's extensive researches in the Indian Archipelago only resulted in ascertaining the exact island to which the original *Casuarius galeatus* is restricted, without making us acquainted with other species. But recent expeditions into the less known parts of the Papuan sub-region have led to a much more extended knowledge of the subject, and we have now arrived at the conclusion that the genus *Casuarius* embraces a numerous group of species, each of which has special distinctive characters and a peculiar geographical distribution. Six of these forms of Cassowary are at the present time represented by specimens living in the Gardens of the Zoological Society of London, where they have attracted much attention. It is with the hope of obtaining further exact information concerning these fine birds from travellers in the countries which they inhabit that I have drawn up the following short summary of the present state of our knowledge of the different species.

The Cassowaries may be divided into three sections, as shown in the subjoined table:—

Table of Species of the Genus Casuarius.

a. Casside lateraliter compressa; appendicula cervicis aut duplici aut divisa.

1. *C. galeatus*, ex ins. Ceram.
2. *C. beccarii*, ex ins. Aroensi Wokan.
3. *C. australis*, ex Australia bor.
4. *C. bicarunculatus*, ex ins. Aroensibus.

b. Casside transversim compressa; appendicula cervicis unica.

5. *C. uniappendiculatus*, ex Papua.

c. Casside transversim compressa; appendicula cervicis nulla.

6. *C. papuanus*, ex Papua boreali.
7. *C. westermanni*, ex ins. Papuana Jobie (?).
8. *C. picticollis*, ex Papua meridionali.
9. *C. bennetti*, ex Nov. Britann.

The first of these sections contains the large species allied to the original *C. galeatus*. These have on their heads an elevated casque, laterally compressed and terminating in a ridge in the same line as the culmen of the bill. They have also a large fleshy caruncle on the front of the neck, ending in two distinct flaps. A single species, which stands somewhat alone and forms a second section, is also of large size, but has the casque transversely compressed and ending in a ridge at a right angle to the culmen. It has but one medial throat-wattle, whence it has been named *uniappendiculatus*. The third section embraces the smaller species allied to Bennett's Cassowary, or the Mooruk. These have the casque transversely compressed as in the one-wattled species, but have no wattle on the throat—only a bare, brightly coloured space. They are further distinguishable by the extraordinary form of the claw of the inner toe, which attains a remarkable length and is used as a weapon of attack. Of these three sections, the following nine species are now known with more or less certainty:—

1. THE COMMON CASSOWARY (*C. galeatus*), of which there is now no doubt that the island of Ceram is the true habitat. Of this species we have now one example, not yet adult, in the Zoological Society's Gardens.

2. BECCARI'S CASSOWARY (*C. beccarii*).—This form is closely allied to *C. galeatus*, but is easily distinguishable from it by having only one medial throat-wattle, which is slightly divided at the extremity. It has a large elevated casque like the Australian Cassowary, and remarkably large strong legs. The species was originally described by me from a specimen in the Museo Civico at Genoa, which was brought by Beccari from the Aroe Islands; but the living individual now in the Zoological Gardens (if it is really of the same species) was obtained in the south of New Guinea by H.M.S. *Basilisk*.

3. THE AUSTRALIAN CASSOWARY (*C. australis*).—Of this Cassowary, remarkable in the adult for its large size and highly elevated casque, we have now two specimens living in the Gardens. It is a native of Northern Queensland and the peninsula of Cape York.

4. THE TWO-WATTLED CASSOWARY (*C. bicarunculatus*).—This species, which is easily known, even in the young condition, by having the wattles separated and placed far apart on the sides of the neck, was first described from two examples, formerly living in the Zoological Gardens, but now dead. There are several stuffed specimens of it in the Leyden Museum, which were undoubtedly obtained in the Aroe Islands.

5. THE ONE-WATTLED CASSOWARY (*C. uniappendiculatus*).—The single small wattle which ornaments the middle of the neck at once distinguishes this fine species, of which we have now in the Gardens a young specimen brought by H.M.S. *Basilisk* from the coast on the north of New Guinea, opposite Salawatty. There is a good figure of this Cassowary in the supplement to Gould's "Birds of Australia."

6. THE PAPUAN CASSOWARY (*C. papuanus*).—This name has been given to two specimens in the Leyden Museum, obtained near Dorey, in New Guinea, by Rosen-