the initial croak would come from one side of the pond, then the other, and so continue to vary. This shows at once that not any one individual started and stopped the croaking of its companions.

Hoping to find that in the pursuit of prey, which is principally insects, frogs would display some intelligence, I tried several experiments to test their ingenuity; but it was of no avail. Unless the food could be easily reached by making the simple exertion of a single leap, the frogs would go hungry. Subsequently I placed a large fly upon a piece of thin mica, and surrounded it with a circle of fine needles, piercing the plate. The fly thus protected could only be seized by the frog suffering a severe pricking of the jaws. This, I found, a frog would suffer indefinitely, in its attempts to secure the fly. In one instance, the frog, which had been fasting for seventy-two hours, continued to snap at the needle-protected fly until it had entirely skinned its upper jaw. I concluded from this, that the wits of a frog were too limited to be demonstrated.

Some weeks after having completed these experiments, I had the good fortune to capture two fully grown specimens of the bull-frog (Rana Catesbyana); and, noticing their enormously distended sides, I examined the stomach-contents of the two. In one was a full-grown chipmunk (Tamias striata); in the other, a garter-snake (Eutania sirtalis) measuring eighteen inches in length, and also a field-mouse (Arvicola riparia). On close examination, I found that the snake had partially swallowed the mouse; and, while thus helpless, the frog had evidently attacked the snake, and swallowed it.

It is evident, I think, that the frog recognized the helpless condition of the snake at the time, and took advantage of it. If so, it is evidence of a degree of intelligence, on the part of the frog, which the results of my experiments on the frogs generally, had not led me to expect. Certainly a frog, however large, will not attack even a small snake if it is possessed of its usual activity.

The salamanders, on the other hand, by their active movements, wandering disposition, quickness of hearing, and other minor characteristics, give evidence of greater intelligence. This I can state of them, however, as an impression only; for my efforts to prove them possessed of cunning were not successful. The purple salamander, it is true, fights when captured, curving its back, and snapping viciously. This no frog ever does. The common spotted triton (Diemyctelus) becomes quite tame when kept in an aquarium, and, as I found, is soon able to determine the difference between a fly held against the glass and one held over the water. I frequently held a fly against the glass, and very near the triton; but it took no notice of it, after one or two efforts to seize it, but would follow my hand, and, when the fly was held over the surface of the water, the triton promptly leaped at and seized it. This is, indeed, but meagre proof of intelligence, but seems to show, I think, that a salamander is more cunning than a frog.

My observations lead me to conclude, that the habits of an animal have much, if not all, to do with the intellectual capacity it possesses. Frogs, as a class, are not migratory. They frequent a given pond or stream; and, sustained by the insect-life that comes to them but is not sought, they pass an eventless life, trusting, as it were, to luck. Such an existence requires no intellectual exertion, and none is made. The salamanders, on the contrary, are far more wandering and active. They appear to be ever in search of food, and, when lying in wait for it, choose such positions as experience has taught them are best adapted for the purpose: at least, my studies of such specimens as I have kept in confinement lead me to believe so. Intellectually, therefore, the salamanders are in advance of the frogs; but the batrachians as a class, although higher in the scale of life than fishes, are, I believe, inferior to them in intelligence.

CHAS. C. ABBOTT, M.D.

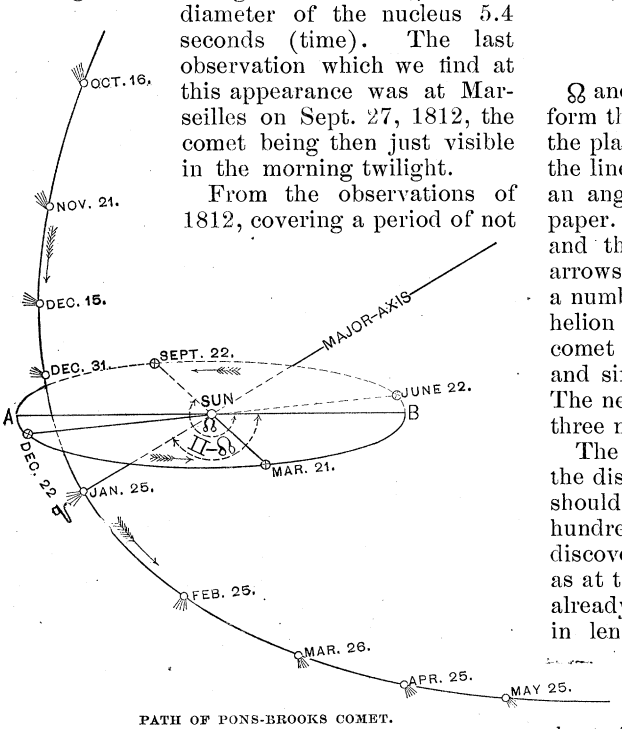
THE PONS-BROOKS COMET.

THE comet which is now being observed at its first predicted return was discovered by Pons, at Marseilles, two hours after midnight of July 20, 1812. Pons was at the time *concierge* at the Marseilles observatory, but afterwards became its director. He died in Florence, Oct. 14, 1831, at the age of seventy, having, between the years 1801 and 1827, discovered no less than thirty-seven comets; this one, according to Zach (*Monatl. corr.*, xxvi. 270), the sixteenth in ten years.

Pons describes the comet at the time of discovery as an irregular, nebulous mass, without coma or tail, and invisible to the naked eye. Having made sure, from the motion, that it was really a comet, he announced his discovery on July 22; and, from July 25 to Aug. 3, it was bright enough to be observed, at lower culmination, with the Marseilles in-

struments. The comet seems to have been discovered independently at Paris by Bouvard, who describes it thus: "Cette comète était très petite. Elle ne fut visible à la simple vue que pendant quelques jours. Le 18 août son noyau, assez brillant, était entouré d'une nébulosité qui offrait l'apparence d'une chevelure et d'une queue d'environ 2° de longueur." Bode reports the comet visible to the naked eye on Sept. 9, 1812, and on Sept. 14 he gives the tail as 1° long; while on the same date, at Seeberg, the tail is given as 2° 17′, and the diameter of the nucleus 5.4 seconds (time). The last observation which we find at this appearance was at Marseilles on Sept. 27, 1812, the comet being then just visible in the morning twilight.

From the observations of 1812, covering a period of not



PATH OF PONS-BROOKS COMET.

quite ten weeks, several orbits were computed, that of Encke assigning a period of 70.68 years. More recently Messrs. Schulhof and Bossert, from an exhaustive discussion of all the observations available (including some not known to Encke), predicted a return to perihelion about September, 1884, though they pointed out that in their period there was an uncertainty of ±5 years. The comet was actually found by Brooks (Phelps, N.Y.) on Sept. 1, 1883, some time before it had reached the sweeping ephemeris of Schulhof and Bossert; but its identity was soon established.

The annexed diagram will assist in forming an idea of the path in which the comet is moving. The earth's orbit (the northern side uppermost) is shown orthographically projected upon the plane of the comet's orbit. The data necessary for defining the ellipse in which the comet moves are, the angle ☊ (254°), the longitude of the ascending node; the angle Ⅱ − ☊ (−161°), the difference between the longitude of the node and the longitude of perihelion (Ⅱ); the angle i, the inclination between the earth's orbit and that of the comet; q, the perihelion distance (0.775) expressed in units of the earth's distance from the sun; T, the date of perihelion passage; and e, the eccentricity (0.96), or ratio, —

$$\frac{\text{distance from centre to focus}}{\text{semi-axis major}}.$$

☊ and Ⅱ − ☊ are shown in the figure; and, to form the complete picture, we are to imagine the plane of the comet's orbit revolved about the line AB, the line of nodes, until it makes an angle of 74° (i) with the plane of the paper. The directions in which the comet and the earth are moving are indicated by arrows. The positions of the two bodies on a number of dates are also given. The perihelion is reached on Jan. 25, 1884, when the comet is seventy million miles from the sun, and sixty-eight million miles from the earth. The nearest approach to the earth, about fifty-three million miles, is upon Jan. 8, 1884.

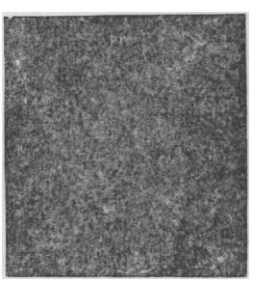
The brightness, as far as depending upon the distance from the sun and from the earth, should reach a maximum about Jan. 11, a hundred and forty-five times as bright as when discovered by Brooks, and five times as bright as at the time of Bode's observation, when, as already noted, the comet had a tail a degree in length. We might expect, then, that it would be visible to the naked eye from the middle of December to the middle of February, equalling, at its best, the brightness of a star of the third magnitude; but unusual and unexplained fluctuations in the brightness have been observed, which render these predictions a little untrustworthy. In the first week in December the comet passed within about seven degrees of the bright star α Lyrae, and continued its motion rapidly towards the south and east.

Since its discovery by Brooks, our visitor has behaved in a most peculiar manner as regards brightness. The theoretical change is given in Professor Boss's article in *Science*, ii. 449. On the following page we find observations made at Harvard college observatory on Sept. 21, 22, 23. The variability remarked at Harvard is confirmed by observations made at about the same time at Paris, Hamburg, and Dresden; so that we find a pretty well defined

maximum of from the seventh to the eighth magnitude, reached between Sept. 22 and 24, falling off suddenly on either side; for on Sept. 21 the comet was 'very faint,' with 'a slight condensation,' and on the 28th it was tenth to eleventh magnitude. Bigourdan says, "It had for some time a brilliancy thirty or forty times what might have been expected, — a fact difficult to explain on the theory that comets have no light of their own."

As regards any variability at its former appearance, the observations of 1812 are not sufficiently precise to furnish conclusive evidence.

A rough sketch of the comet, as seen with the 26-inch equatorial of the Naval observatory, Washington, was made on Sept. 26, 1883; and by permission of the superintendent of the observatory, Rear-Admiral R. W. Shufeldt, it is here given, with the observer's note. "Sept. 26.39, 1883; — observer, Winlock; —



PONS-BROOKS COMET, SEPT. 26, 1883.

26-inch equatorial, magnifying power 183. The comet appeared as an oval, nebulous mass, with a fairly well defined stellar nucleus, somewhat elongated in the *preceding following* direction, the nucleus being situated at about the centre of the nebulosity. The whole mass was some 6′ or 8′ in diameter."

The spectrum of the comet was examined by Konkoly,[1] Sept. 27, 1883. It consisted of three extremely faint bands, — the middle one brightest, the third (from the red end) next, and the one towards the red faintest. The bands ended in points, and were unequal in length. They sometimes lighted up for one or two seconds; and at these times they seemed to be much shorter than ordinarily, — a phenomenon quite new to the observer.

From the similarity of the orbits of the comets of 1812 and 1846, IV., Kirkwood has suggested (*Amer. journ. sc.*, 2d series, xlviii. 255) that they were doubtless members of a cometary system, and were brought into the solar system 695 years before the Christian era by the influence of Neptune. Schulhof and Bossert, in pointing out an error in Kirkwood's calculation, modifying somewhat his conclusion, say that the remarkable resemblance between the orbits of these comets indicates that there was originally some intimate connection between them. Indeed, these two comets, and the comets of 1815, 1847, V. (Brorsen), and 1852, IV. (Westphal), seem to belong to the same family.

As to the proper designation of this comet of Pons and of Brooks, authorities and precedents differ. In *The observatory* for November, 1883, Mr. W. T. Lynn writes, "I presume the designation Pons-Brooks's comet is understood to be only provisional. According to rule, it should be Pons's comet; . . . its permanent name must therefore be 'Pons's long-period comet,' or 'Pons's periodical comet of 1812.'" The shortest designation seems likely to prevail; and doubtless the comet will be known hereafter as the 'Pons-Brooks comet,' or perhaps simply as the 'Comet of 1812,' it being the only comet that was seen in that year.

W. C. WINLOCK.

[1] *Astron. nachr.*, No. 2547. *The observatory*, November, 1883, 333.

THE AINOS OF YEZO.[1]

ALTHOUGH the literature relating to the Island of Yezo, and the Ainos, — the inhabitants of this island as well as the southern half of Saghalien (or Karafuto), the Kurile Islands, and the southern extremity of Kamtchatka, — has increased much in recent years, still a description of the same, based upon personal observation, may be of use in explaining the many contradictory reports and opinions of ethnologists. Two facts should be borne in mind, — first, that the Ainos are not, even in the most remote way, to be classed with the dark races; and, second, that they are in no way related with their southern neighbors, the Japanese. With regard to their color, I must remark, that I have not found the Ainos of either sex darker than many Europeans: indeed, it is not rare to find in southern and eastern Europe darker individuals than are to be seen among the aborigines of Yezo. The assertion that the Ainos are dark brown, or even black, is sometimes made by those who do not take into consideration the fact that superstition prevents them from washing, and that consequently their complexion appears at times much darker than it really is. The real color, which may be best seen to advantage among the Ainos living on the seashore, is a little lighter, and less reddish, than that of the Japanese. The development of hair is somewhat remarkable: in the case of the men it covers the entire body to about the extent seen in very hairy Europeans. The beard is luxuriant and beautiful: the women imitate it by tattooing. The curly or wavy

[1] By Professor BRAUNS of Halle. Translated from the memoirs of the Berlin anthropological society.