OUR ASTRONOMICAL COLUMN.

APRIL SHOOTING STARS.—Mr. Denning writes:—"The gibbous moon will be present in the sky during the ensuing return of the April Lyrids, so that a conspicuously visible display can hardly be expected. The night of April 21 will probably be the time of maximum, but nothing can be definitely predicted as to the strength of the coming shower. It seems to vary from year to year in an irregular manner, and has seldom presented a rich display comparable with that of the August Perseids.

"In 1909 there were few of the April Lyrids visible, though the skies were very clear on the important nights of April 20 and 21.

"The shower is, however, a very brief one, and often evades English observers by occurring in the daytime or at a period of cloudy weather or bright moonlight. It is a system which certainly requires much further observation, though it seldom provides us with a spectacle of abundant and attractive character; but it may return at any time and present a repetition of the splendid shower witnessed in 1803, so that it should be carefully watched every year."

HALLEY'S COMET.—The Cape Town correspondent of the *Daily Mail* announces that Halley's comet was observed, after its conjunction with the sun, at the Cape Observatory at 5h. 50m. a.m. on April 8. The comet was visible for ten minutes before becoming lost in the increasing daylight, and is reported as being brighter than when seen in February. The comet was observed at the Vienna University Observatory shortly before 5.0 a.m. on April 11, and was seen also at the Perth Observatory, Western Australia.

In No. 421 of the *Observatory* (p. 182) it is suggested that, as Dr. Wolf saw the comet as a naked-eye object on February 11, the estimated magnitude (9.0) given for the end of February must have been far too low; on the assumption that the brightness varies as $1/r^4 \Delta^2$, the comet should be at least as bright as the first magnitude when near the earth on May 20.

The question of the comet's brightness during May is also discussed by Dr. Ebell in No. 4400 of the *Astronomische Nachrichten* (p. 140). Taking the recorded magnitudes, at various intervals from perihelion, during the apparition of 1835-6, and comparing them with those already recorded for the present return, Dr. Ebell finds that the apparent magnitude at the time of greatest brightness, May 21, may be about -1.7, or about equal to that of comet 1910a at its perihelion. On this basis the present magnitude is about 4.0, and the comet should remain a naked-eye object until about the end of July.

A photograph of the comet taken at Juvisy on February 12 is reproduced in the April number of the *Bulletin de la Société astronomique de France*; at that time the tail showed as a feeble, fine trace about $1\frac{1}{2}^\circ$ long. Another photograph was taken on March 7 with nineteen minutes' exposure, but only a feeble image of the head was obtained. A drawing by M. Baldet, made on March 5, when the magnitude was estimated as 6.0, shows a V-shaped appendage, the angle between the two tails being 70° , and the southern tail being the faintest and shortest.

Reports from various countries emphasise the necessity for spreading sound knowledge concerning the comet. The suicide of a Hungarian farmer "on account of Halley's comet" is followed by a report from Odessa that in southern Russia there is a veritable popular terror, which is being exploited by unscrupulous persons for the purpose of obtaining money, for special prayers, &c., from the ignorant natives. We welcome, therefore, a brochure received from the Manila Weather Bureau, in which Father Zwack carefully analyses the alleged sources of catastrophe, and shows how utterly puerile they are. Such brochures, if printed in the vernacular, would do a great deal towards allaying excitement, which otherwise may lead to serious trouble.

COMET 1910a.—A number of observations of, and an ephemeris for, comet 1910a are published in No. 4400 of the *Astronomische Nachrichten*. Among the former are some, made near the end of January, by the late M. Charlois at the Nice Observatory, and an interesting set communicated by Dr. Ristenpart from the Santiago

Observatory. At Santiago they picked up the comet about three-quarters of an hour before noon on January 19. (23h. 15m., January 18), and followed it until after 6 p.m.; at the time of the first observation it was only 7° east and $3\frac{1}{2}^\circ$ north of the sun. Herr Castro, who made the position settings during the afternoon, noted a striking falling off in the apparent brightness of the comet during the $2\frac{1}{2}$ hours he had it under observation.

THE GALACTIC SYSTEM, ITS STRUCTURE AND ORIGIN.—An interesting discussion of the galactic system, its structure, origin, and relations in space, is published—in English—by Dr. Karl Bohlin in No. 10, vol. xliii., of the *Kungl. Svenska Vetenskapsakademiens Handlingar*. Having observed a large number of nebulae and clusters, and, in a previous paper, discussed the measures of the globular cluster M. 92, Dr. Bohlin was induced to take up the study of the distribution of the various classes of the heavenly bodies, and commenced with that of globular clusters. From this point of view he has studied the distribution of a large number of these objects, and concludes therefrom that their system is situated in the centre of the galactic system, for only on this assumption can their apparent clustering on one side of the galactic circle be explained. Extending the study to various other classes of celestial objects, the author evolves a systematic evolution of them which accounts for their apparent distribution and various forms. In this hypothesis planetary nebulae originally consist of rotating luminous shells filled with very tenuous matter. These shells, breaking down at their poles, form apparent "ring" nebulae with distinguishable nuclei. The galactic system is supposed to have been such a planetary nebula, having reached at present an advanced form of ring nebula, of which the system of globular clusters forms the nucleus; the spiral nebulae, clustered near the poles, parts of the broken shell; and the Milky Way, the equatorial belt. Diagrams illustrating these distributions, and twenty-seven reproductions from photographs of various nebulae, are shown on the six plates accompanying the paper.

SATURN'S SATELLITES AND RINGS.—In No. 610 of the revised *Astronomical Journal*, now edited by Prof. Lewis Boss, Prof. Barnard records some measures of the eclipses of Saturn's satellites, made by him during 1906-8. The measures are given in detail, and some interesting notes on the dimming of the satellites Rhea and Dione, immediately before the final disappearance, are appended. In the case of the former the loss of light amounted to as much as 2.0 to 2.5 magnitudes. Measures of the relative distances of the satellites and of the position-angles of the rings during the same period are also given.

THE SYSTEM OF ϵ HERCULIS.—From the investigation of a large number of plates taken at the Dominion Observatory, Ottawa, Mr. Harper has re-determined the orbit of the spectroscopic binary ϵ Herculis, and finds several departures from the elements determined from the 1907-8 spectrograms. The period, according to this later determination, is 4.0235 days, and is a varying quantity (the *Journal of the Royal Astronomical Society of Canada*, No. 5, vol. iii.).

THE GAZELLES OF SEISTAN.¹

MAJOR R. L. KENNION, British Consul at Seistan, has had the good fortune to bring to light what are practically two new species of gazelle from the Kain and Seistan districts of eastern Persia, specimens of both of these, presented by Major Kennion, being exhibited in the Natural History Museum. Of the first of these species, typified by the mounted head of a buck from Kain, two notices by myself appeared in the *Field* newspaper for 1908 (vol. cxi., pp. 70 and 499). In the earlier of these it was compared to the Atlas or edmi gazelle (*Gazella cuvieri*) and Merrill's gazelle (*G. merrilli*) of Palestine, with the former of which, and probably also with the latter, it agrees in the presence of horns in the female. Compared with the type-skull of Merrill's gazelle figured by Mr. O. Thomas in the *Proceedings of the Zoological Society* for 1904, vol.

¹ Communicated by permission of the Trustees of the British Museum.

ii., p. 348, the head of the Kain gazelle differs by its larger ($11\frac{1}{4}$ inches) and more fully ringed horns, the number of rings in this specimen being sixteen, and also by their less distinctly S-shaped curvature in profile, and rather more sublyrate form when seen from in front. In the general contour of the horns, the characters of the face-markings, the very tall ears, and the large bodily size, this gazelle comes, indeed, very close to the edmi, and in all these respects differs from the goitred gazelle (*G. subgutturosa*) of western Persia, as it also does by the smaller extent of the white area on the buttocks, which does not reach up to the root of the tail, but is restricted to the inner sides of the thighs. In this latter feature, shown in a mounted specimen, the Kain gazelle agrees with the Indian *G. bennetti*, from which it differs by its superior size (shoulder-height of a fully adult buck probably about 28 inches), larger ears, and more distinctly sublyrate and slightly incurving horns.

In the second notice I compared the Kain gazelle with the Yarkand gazelle (which I regard as specifically distinct from the goitred species), and named it *G. yarcandensis kennioni*, not being then aware that it differed by the presence of horns in the female and the smaller amount of white on the buttocks. The name *kennioni* would stand as a specific title were it not that in the Proceedings of the Zoological Society for 1873, p. 317, Dr. Blanford described a horned female gazelle from Jalk, on the Baluchi border of eastern Persia, as a new species under the name of *G. fuscifrons*. In a paper published in the same volume, p. 545, this species was recognised as valid by the late Sir Victor Brooke, who particularly referred to the large size of its ears as a distinctive feature, especially as compared to *subgutturosa*. Later on, however, Dr. Blanford, in the "Fauna of British India" (where Jalk is stated to be in Baluchistan, although in "Eastern Persia," he had rightly referred to it as forming the southern edge of the Seistan desert), identified *fuscifrons* with *bennetti*, on the ground that a male obtained by Sir O. St. John appeared inseparable from the latter. From the fact, however, that the Kain district, which is the northern continuation of the Seistan desert, is the home of a large gazelle allied to *bennetti* in the presence of horns in the female and the small extent of the white area on the rump, but with larger ears and rather more sublyrate horns, there can be no doubt that this gazelle is no other than *fuscifrons*, which must be re-established as a species. *Gazella yarcandensis kennioni* therefore becomes *G. fuscifrons*, although Kennion's gazelle may be retained as the English name.

This being so, it is doubtful whether the Indian *G. bennetti* really occurs in Persia at all. In "Eastern Persia" Dr. Blanford stated that he obtained a male referable to that species from the Bampur district of eastern Persia (alluded to as being in Baluchistan), which differed from Indian examples only in some details of the horns, adding that he believed this gazelle to extend on the lowlands to the head of the Persian Gulf, while above the 3000-foot contour it was replaced by the goitred gazelle, distinguishable, even at a distance, by its lighter colour. From the new evidence it appears that the lowland gazelle of the Persian Gulf is *fuscifrons* rather than *bennetti*.

The second of the Seistan gazelles is represented by an adult male standing about 39 inches at the shoulder, and characterised by the great size of the ears, the marked incurving of the tips of the sublyrate horns, and the small extent of the white area on the rump, which does not reach the root of the tail. In most of these features this species resembles the Yarkand gazelle, as it also does in the absence of horns in the female, although it differs by the small extent of the white on the rump, which in the Yarkand species (plate v. of Blanford's "Mammals of the Second Yarkand Mission") is very large and ascends high up on each side of the root of the tail. This gazelle greatly exceeds *subgutturosa* in size, as well as in the much larger ears, less divergent horns, and the smaller white rump-patch, but resembles that species in that the male has a "goitre." Taking the mounted specimen in the museum as the type, it may be known as the Seistan gazelle, *G. seistanica*.

The foregoing species collectively indicate a transition from the edmi and *bennetti* type on the one hand, to that of the goitred gazelle on the other, as is indicated in

the case of some of the Asiatic species by the following table:—

(a) Females horned; no goitre; tips of horns not distinctly inturned; rump-patch small.

(1) Indian gazelle—*G. bennetti*.

Height about 25 or 26 inches; ears moderate; no inturning of horn-tips.

(2) Kennion's gazelle—*G. fuscifrons*.

Larger, height probably about 28 inches; ears longer; horn-tips slightly inturned.

(a') Females (except *marica*) hornless; a goitre; tips of horns distinctly inturned.

(b) Rump-patch small; face-markings distinct.

(3) Seistan gazelle—*G. seistanica*.

Very large; height about 29 inches; ears very long; horns sublyrate.

(b') Rump-patch large.

(c) Face-markings; horns sublyrate; colour dark.

(4) Saikik, or Yarkand gazelle—*G. yarcandensis*.

About the size of last, but ears apparently shorter.

(c') Face-markings nearly obsolete; horns divergent; colour in winter very pale.

(5) Goitred gazelle—*G. subgutturosa*.

Size small, 24 to 26 inches; ears short; females hornless; dark lateral band faint.

(6) Marica gazelle—*G. marica*.

Ears taller; females horned; dark lateral band distinct.

The African edmi, and probably the Syrian Merrill's gazelle, come in the first group. The Mongolian *G. gutturosa* is a larger member of the last group, distinguished by the small size and peculiar form of the horns of the bucks, which do not diverge after the fashion of *subgutturosa*. The Central Asia *C. przewalskii* is another allied type.

Certain immature gazelles from Eastern Persia now exhibited in the Zoological Society's Gardens as *G. subgutturosa* are apparently *G. fuscifrons*.

R. LYDEKKER.

BOURNES; OR INTERMITTENT SPRINGS.

INTERMITTENT streams break out in our chalk valleys when there has been a partial return to the conditions of rainfall prevailing during the period of the excavation of the valleys. The effect of a heavy rainfall is not seen immediately. A bourne may, indeed, break out during a temporary drought following. Its immediate cause is the rise of the saturation-level until it intersects the bottom of the valley. The water then rises out of the ground, and flows until the curve of saturation sinks by reason of the relief afforded by the flow. While still rising, the bourne will make its appearance at successive points higher and higher up the valley.

These bournes afford a valuable clue to the method of formation of dry chalk valleys. Given a period of greater rainfall, and the permanent rise of the saturation-level would give a permanent stream, with considerable powers of excavation. Flints lining the bed of the Croydon Bourne are covered with a calcareous incrustation, so that solution and corrosion would both do work in the formation of the valley.

The earliest record of the Croydon and other bournes has been traced by Mr. Baldwin Latham to Warkworth's "Chronicle," which shows that in 1473 "womere watere ranne hugely." Bournes rose at St. Albans, Lewisham, and Canterbury, as well as at Croydon. In Leland's "Itinerary" reference is made to a bourne at Drelingore, near Dover, and this was also flowing in 1904, the year of the last great flow of the Croydon Bourne. In Yorkshire, the vipsies or gipseys are apparently similar to bournes. "Nailbourne" is a name formerly given to them in Kent, or, with a corruption of the spelling, "Eylebourne." "Wellesbourne" and "Winterbourne" are also met with. The Hertfordshire Bourne, which has again been active this year, was formerly known as the Wenmer, or Womer. This is referred to by Camden as breaking out near Watling Street. Childrey (1661) says that it is popularly believed that it never "breaketh out but it foretelleth dearth and scarcity of corn, or else some extraordinary dangerous times shortly to ensue." This, indeed, was a very customary superstition in connection with all these