contain other substances in addition to hydrogen. They are seen mounting upwards to enormous heights with almost incredible velocities, and their ascent is accompanied by violent lateral motions. Such prominences have been seen with an upward velocity of 250 miles a second, and of a height as great as 400,000 miles. There is also evidence that some prominences consist of mixed up-rushes and down-rushes, and it may turn out eventually that this is the case in all the metallic prominences.

According to the gravitation-dissociation theory of the formation of spots, we ought to find that the effects, in various degrees, produced by down-rushes of associated matter are related to the effects, in like degrees, produced by the corresponding up-rushes of dissociated materials. Comparing, then, the facts already stated, we have :—

Effects of Down-rush.	Effects of Up-rush.
1. Pores.	1. Domes.
2. Veiled spots.	2. Metallic strata and small prominences.
3. Quiet spots.	3. Quiet prominences.
4. Disturbed spots.	4. Metallic prominences.

It is a fact that the pores and domes are very closely associated over all parts of the sun, and that the domes are most prominent in places previously occupied by spots. All large spots are seen to be accompanied by metallic prominences, when observed at the edge of the sun. There is also a strict relationship between the intensity of action going on in a spot and the associated prominence, so much so that a very violent change in a spot on the disk sometimes causes the bright prominence lines to become visible in its spectrum. The ordinary metallic prominences, as already stated, may consist of both ascending and descending material; this will be best understood by likening the whole phenomenon to a splash.

Physics of a sun-spot cycle.

We have previously seen that spots and metallic prominences are very intimately connected as regards their occurrence in zones, and this intimacy is easy to explain by supposing things to happen in the way here set forth. The height of the solar atmosphere is greater over the equator than at the poles; particles condensed on the outside at the poles have therefore a relatively small velocity when they fall into the photosphere, and are able to produce only pores or veiled spots. Over the equator the particles attain a higher velocity in their fall, but they also have to pass through a much greater thickness of atmosphere and undergo so much dissociation that on reaching the photosphere they are incompetent to produce spots. In mid-latitudes, therefore, the falls of condensed particles should be most effective in producing spots. In this way the absence of spots at the poles and equator is explained,—one of the best-known facts of solar physics. The falls of the condensed particles, or meteoric matter, into the sun increase the temperature of the atmosphere over the spots and prominences which they produce, so that other falls in the same region are not effective in producing spots on account of the increased dissociation which they must undergo before reaching the photosphere. If the material condensed in those regions is to produce a spot, it must be removed to some place where it can reach the photosphere without being dissociated. Hence from the first appearance of spots after a sun-spot minimum there is a continual change of latitude. From minimum to minimum there is a regular decrease in the latitude of spots; hence it is clear that there must be currents from the poles towards the equator in the upper atmosphere of the sun, causing the removal of condensed materials to lower and relatively cooler latitudes. Assuming the existence of such currents, we ought to find that successive spots have a tendency to form along the same meridians, for the polar currents would carry the condensed materials to lower latitudes in a nearly meridional direction. Examination of sun-spot records for 1878-79 shows that there is a marked tendency for spots to follow each other in meridians. The existence of such currents is further supported by the outcurving of the corona at the solar poles as observed in several eclipses. If these currents exist, there must also be compensating currents towards the poles in the lower parts of the sun's atmosphere, carrying incandescent vapours along with them. Small prominences often give indication of motion towards the poles which such currents would produce, and examination of sun-spot records also shows that the tendency of the proper motion of the spots is polewards. Hence, although the existence of these currents has not been definitely proved, there is strong evidence that there exists some circulation of this nature in the solar atmosphere.

When once the falls have commenced, if this hypothesis is true, they should rapidly increase in intensity, for, as it is the falls which increase the temperature of the lower atmosphere by the conversion of their kinetic energy into heat, the more falls there are the more material will be taken first to the poles and then towards the equator, and therefore there will be more available spot-forming material. But we know that this increase in intensity does not go on for ever, and there must therefore be some regulating influence. The increase of temperature and possibly of the height of the solar atmosphere, due to the increased falls, will eventually become such that the descending materials are dissociated before they reach the photosphere. The production of spots must therefore gradually diminish until they finally disappear and end the spot cycle. At the minimum period, therefore, pores and veiled spots, due to less powerful energies, are at a maximum.

Records of eclipses, occurring when the sun was quietest, show that the condensing and condensed materials brought to the equator by the polar currents probably extend far beyond the true atmosphere of the sun and are there collected, possibly in the form of a more or less regular ring the section of which widens towards the sun, the widest part being within the boundary of the sun's atmosphere. If we assume such a ring under absolutely stable conditions, there will be no fall of material, and therefore no prominences or spots. But suppose a disturbance caused, as before, by collisions, which most likely occur where the particles brought by the polar currents meet the surface of the ring. These particles then fall from where the ring first meets the atmosphere on to the photosphere, and form the first spots. Eclipse records show that this action takes place about 30° lat. According to this view, there are usually no spots above 30° lat., because there is no ring, and because the atmosphere is too low to give the height of fall necessary to produce spots. There are no spots at the equator for the reason that the condensed matter has to pass for perhaps millions of miles through strata of increasing temperature, and do not therefore reach the photosphere before being dissociated. Accordingly, we ought to find that at and after the maximum the corona is brighter and more truly a gaseous body on account of the increased temperature. This is in strict accordance with eclipse observations extending over twenty years. According to this view of the solar economy, the sun ought to give out more heat at a maximum than at a minimum period, when the number of falls is greatest; on this point see the article METEOROLOGY (vol. xvi. p. 167 *sq.*).

The Sun's Place among the Stars.

The relative nearness of the sun makes it convenient as a type of those stars which on account of their great distance are less accessible to minute observation. If the sun were at a greater distance, its spectrum would become much fainter and would not show so much detail, but its general character would not be altered: its dark lines would not become bright ones. In the atmospheres of the various members of the solar system, including the earth, there is a very considerable absorption of blue light. We know also that this condition applies to the sun.

Star absorption of light.

The light we receive under present conditions we call white; but, if its own atmosphere and ours were removed or became so changed as to no longer absorb blue light, the sun would appear blue. If, on the other hand, the blue absorption were enormously increased, so that it extended into the green, the sun would appear red, because every other kind of light would be absorbed. If two kinds of absorption—one in the red, the other in the blue—were going on together, as they sometimes do in our laboratories, the sun would then appear green. Although these changes are not of actual occurrence in the sun, we find each of these conditions represented among the stars. In the coloured stars, which may be red, green, or blue, we are simply dealing with this kind of absorption phenomena. This difference in the conditions of absorption in the stars, however, is by no means the most important one: the difference of temperature as indicated by the spectrum is of primary importance. As in our laboratories the spectrum of a substance is changed by a variation of temperature, and always in a regular way, so the nature of a star's spectrum furnishes a clue to its probable state as regards heat. For example, we may submit carbon vapour to a low temperature, and we shall then obtain what is called a spectrum of flutings; on increasing the temperature, the flutings are replaced wholly or partially by lines, according to the amount of increase. From hundreds of observations of this kind, both on carbon and other substances, it may be safely inferred that a fluted spectrum indicates a lower temperature than a line spectrum. There are doubtless substances in the sun's atmosphere which, although represented by lines in its

spectrum, can be submitted to low conditions of temperature so as to give fluted spectra. There can be little doubt, therefore, that a cooling of the sun would be followed by a change in its spectrum, which would cease to be one of lines and become one of flutings. While the sun was acquiring its present intensely heated state, it must at some period of its history have been in a condition of temperature in which its spectrum would consist of flutings, and similarly it must give a fluted spectrum at some future period when it has further cooled.

The ordinary Fraunhofer spectrum gives the sum total of the line absorptions of all the various layers in the sun's atmosphere, but by examining individual layers just off the edge of the disk we can single out the absorption lines produced by the lower layers. Thus the absorption produced by the hottest layer, the chromosphere—hottest because nearest the photosphere—is indicated by its usually simple radiation spectrum when examined in this way. If the sun were made hotter, therefore, the gases which give the simple chromosphere spectrum would have a larger share in the absorption, and the main features of the Fraunhofer spectrum would be the few dark lines corresponding to these bright ones. This being so, a star which gives practically the same absorption spectrum as the chromosphere of the sun must be hotter than the average temperature of the sun's atmosphere,—as hot as the hottest part of it. The bright central part of the sun is not very much less than the whole volume, but it is so much hotter that it gives out thousands of times more light than the atmosphere. The cool vapours in the atmosphere give the dark Fraunhofer lines by their absorption, and even if they are hot enough to give bright lines when seen on the sun's edge they can only reduce the intensity of the dark lines. Here the difference of area between the disk representing the central mass and that representing the sun's atmosphere is very small, and, the light from the central mass being so much more intense, we do not ordinarily see the evidences of radiation, but, in place of it, the absorption of the atmosphere. If, however, we suppose the central mass to be very small compared with its atmosphere, the total radiation of the atmosphere may be sufficiently powerful to overcome the intensity of the light from the smaller central part, so that the spectrum of such a star would contain bright lines from the exterior mixed up with the dark lines from the interior. The spectrum of a star, therefore, does not always depend upon its total diameter, but upon the relative diameters of the central mass and the outer atmosphere. It is a question of sectional areas.

Stellar spectra.

Observations of the spectra of a large number of stars show that, although there is a great difference between individual spectra, they still admit of arrangement in family groups. While some stars give line absorption spectra, others give fluted spectra, and others again give bright lines. They may be conveniently arranged as follows :—

		Example.
Class I.	Stars whose spectra consist of a few thick absorption lines.	α Lyræ.
Class II.	Stars whose spectra consist of a large number of fine absorption lines.	Sun, Capella, &c.
Class III.	Stars with fluted spectra, the maxima of the flutings being towards the red.	152 Schj.
Class IV.	Stars with fluted spectra, the maxima being towards the blue.	α Orionis.
Class V.	Stars whose spectra contain bright lines,—(*a*) of hydrogen, (*b*) of unknown substances.	β Lyræ.

This classification probably represents the stars in order of temperature, class I. being the hottest.

Although different stars may contain lines of identical wavelengths, the thickness of these lines is very liable to variation in passing from one star to another. The thickest lines in the solar spectrum are H and K in the ultra-violet, both of equal thickness; on passing to some of the stars, however, we find H broad with K thin, and in others H without K. This is similar to what occurs in our laboratories when we study the spectrum of calcium, the substance which gives the lines H and K: at the temperature of the electric arc the blue line of calcium is very intense, while H and K are scarcely visible; but on passing to a higher temperature, that of the induction spark, H and K appear. In those stars which give H without K, namely, those in class I., it is probable that there is a very high temperature competent to separate H and K, just as H and K were conjointly separated from the blue line. A further indication of high temperature in the stars belonging to class I. is that the few lines which do occur in their spectra are almost the exact counterparts of those which occur in the hottest layer of the sun, hydrogen lines being especially prominent. The passage from class I. to class II. is by no means sudden: there are stars with every gradation of broad and fine lines. It will readily be understood that the stars of class II. are probably not so hot as those belonging to class I., and the change in the spectrum is supposed to be due to new combinations of the original substances, rendered possible by a reduction of temperature; that is, new lines are formed at the expense of the old ones. The hydrogen lines are very prominent in class II., though not so intense as in class I. The stars of these two classes may be grouped together and called hydrogen stars. Stars belonging to class III. exhibit unmistakable evidence of carbon vapour. Sodium and iron are also often present. All the stars in this class, of which fifty-five are known, agree in having a reddish tint. They are usually faint, and seldom exceed the fourth magnitude. There is evidence of the existence of carbon vapour in the sun's atmosphere, depending upon one solitary fluting, and hence stars of this class probably represent what the sun would become if it were cooled. Class III. therefore represents a lower temperature than classes II. and I. Class IV., containing 475 known members, includes the stars giving fluted spectra with the darkest edges of the flutings towards the violet. The origin of the substances of which they are mainly composed is not at present known. All the principal bands are absolutely unchanging in position, although there is considerable variation in the intensities. The bands in the spectrum appear to result from the rhythmical vibrations of the same substance, probably a complex one. Besides this unknown substance, there are also metallic lines in many of the stars, the complete spectrum consisting of the banded spectrum superposed upon the line spectrum. The metallic lines are generally seen in the spectra of sodium, iron, magnesium, or calcium; the hydrogen lines are very inconspicuous.

These considerations suggest the question of stellar evolution. Comets and nebulæ are now supposed to consist of clouds of stones or small meteorites, and the difference between their spectra may be due to a difference of temperature, that of the nebulæ being highest. Comets ordinarily give the spectrum of carbon, and, if we imagine such cometary matter to surround a central bright nucleus, we have the spectrum of a star of the third class. On the nebular hypothesis, starting with ordinary cometary materials, the small masses resulting from the first condensations gravitate towards each other, and their energy becomes heat by the retardation of their motion on coming in contact. As soon as the condensed mass is hot enough, it gives a fluted spectrum, like stars of the third class. As the energy of condensation increases, the temperature is raised and the spectrum passes from that of a third class star to that of a second class star, and then to that of a first class star. On the subsequent cooling of what is then a star the successive stages will be again passed through in inverse order. According to this view, we ought to find fewer hydrogen stars than carbon stars, because every star is a carbon star at two periods of its existence, but a hydrogen star only once. On this point, however, nothing definite can be stated, as the stars of classes I. and II. have, in consequence of their greater brightness, received more attention than carbon stars.

New and variable stars.

In 1866 a star of the tenth magnitude in the constellation Corona suddenly flashed up into a star of nearly the first magnitude; its spectrum as a tenth magnitude star differed from its spectrum as a first or second,—the latter containing bright lines of hydrogen. In about a month it again became a tenth magnitude star and appeared as if nothing had happened to it. There can be little doubt that here there was a sudden increase of temperature, as evidenced by the spectrum becoming like that of the chromosphere of the sun. Ten years afterwards a new star appeared in Cygnus; it had never been seen before, but appeared suddenly as a third or fourth magnitude star. In about a year it gradually dwindled down to the tenth magnitude, and its spectrum became that of a nebula. This mass was at a stellar distance, but it cannot be considered to have been a large mass of incandescent material, for in that case it would have taken millions of years, instead of only one, to cool down to the tenth magnitude. A possible explanation of most of the new and variable stars is to be found in the meteorite theory: the innumerable components of one group of meteorites colliding with those of another group would be competent to give out light sufficient to make the whole appear as a star. Each meteorite gives only a little light, but the total must be very considerable. The new star in Corona, and similarly all new stars, may have been the result of a collision of two groups of meteorites. They die out quickly because the components are small and far apart. The sudden increase in the brilliancy of the star in Cygnus would be produced by a collision of a meteor swarm with the star already existing. (J. N. L.)

SUN-BIRD, a name more or less in use for many years,[1] and now generally accepted as that of a group of

[1] Certainly since 1826 (*cf.* Stephens, *Gen. Zoology*, xiv. pt. 1, p. 229). Swainson (*Nat. Hist. and Classif. Birds*, i. p. 145) says they are "so called by the natives of Asia in allusion to their splendid and shining plumage," but gives no hint as to the nation or language wherein the name originated. By the French they have been much longer known as "Souimangas," from the Madagascar name of one of the species given in 1658 by Flacourt as *Soumangha*.

over 100 species of small birds, but when or by whom it was first applied is uncertain. Most of them are remarkable for their gaudy plumage, and, though those known to the older naturalists were for a long while referred to the genus *Certhia* (TREE-CREEPER, *q.v.*) or some other group, they are now fully recognized as forming a valid Family *Nectariniidæ*, from the name *Nectarinia* invented in 1811 by Illiger. They inhabit the Ethiopian, Indian, and Australian Regions,[1] and, with some notable exceptions, the species mostly have but a limited range. They are considered to have their nearest allies in the *Meliphagidæ* (*cf.* HONEY-EATER, vol. xii. p. 139) and the members of the genus Zosterops; but their relations to the last require further investigation. Some of them are called "Humming-birds" by Anglo-Indians and colonists, but with that group, which, as before indicated (HUMMING-BIRD, vol. xii. p. 357), belongs to the *Picariæ*, the Sun-birds, being true *Passeres*, have nothing to do. Though part of the plumage in many Sun-birds gleams with metallic lustre, they owe much of their beauty to feathers which are not lustrous, though yet almost as vivid,[2] and the most wonderful combination of the brightest colours—scarlet, purple, blue, green, and yellow—is often seen in one and the same bird. One group, however, is dull in hue, and but for the presence in some of its members of yellow or flame-coloured precostal tufts, which are very characteristic of the Family, might at first sight be thought not to belong here. Graceful in form and active in motion, Sun-birds flit from flower to flower, feeding chiefly on small insects which are attracted by the nectar; but this is always done while perched, and never on the wing as is the habit of Humming-birds. The extensible tongue, though practically serving the same end in both groups, is essentially different in its quasi-tubular structure, and there is also considerable difference between this organ in the *Nectariniidæ* and the *Meliphagidæ*.[3] The nests of the Sun-birds, domed with a penthouse porch, and pensile from the end of a bough or leaf, are very neatly built. The eggs are generally three in number, of a dull white covered with confluent specks of greenish grey.

The *Nectariniidæ* form the subject of a sumptuous *Monograph* by Capt. Shelley (4to, London, 1876-1880), in the coloured plates of which full justice is done to the varied beauties which these gloriously arrayed little beings display, while, almost every available source of information having been consulted and the results embodied, the text leaves little to be desired, and of course supersedes all that had before been published about them. This author divides the Family into three subfamilies:—*Neodrepaninæ*, consisting of a single genus and species peculiar to Madagascar; *Nectariniinæ*, containing 9 genera, one of which, *Cinnyris*, has more than half the number of species in the whole group; and *Arachnotherinæ* (sometimes known as "Spider-hunters"), with 2 genera including 11 species—all large in size and plain in hue. To these he also adds the genus *Promerops*,[4] composed of 2 species of South-African birds, of very different appearance, and the affinity of which to the rest can as yet hardly be taken as proved. According to Mr Layard, the habits of the Cape Promerops, its mode of nidification, and the character of its eggs are very unlike those of the ordinary *Nectariniidæ*. In the British Museum *Catalogue of Birds* (vol. ix. pp. 1-126, and 291) Dr Gadow has more recently treated of this Family, reducing the number of both genera and species, though adding a new genus discovered since the publication of Capt. Shelley's work. (A. N.)

SUN-BITTERN, otherwise the CAURÂLE,[5] the *Eurypyga helias* of ornithology, a bird that has long exercised systematists and one whose proper place can scarcely yet be said to have been determined to everybody's satisfaction.

According to Pallas, who in 1781 gave (*N. nördl. Beyträge*, ii. pp. 48-54, pl. 3) a good description and fair figure of it, calling it the "Surinamische Sonnenreyger," *Ardea helias*, the first author to notice this form was Fermin, whose account of it, under the name of "Sonnenvogel," was published at Amsterdam in 1759 (*Descr., &c., de Surinam*, ii. p. 192), but was vague and meagre. In 1772, however, it was satisfactorily figured and described in Rozier's *Observations sur la Physique*, &c. (v. pt. 1, p. 212, pl. 1), as the *Petit Paon des roseaux*—by which name it was known in Cayenne.[6] A

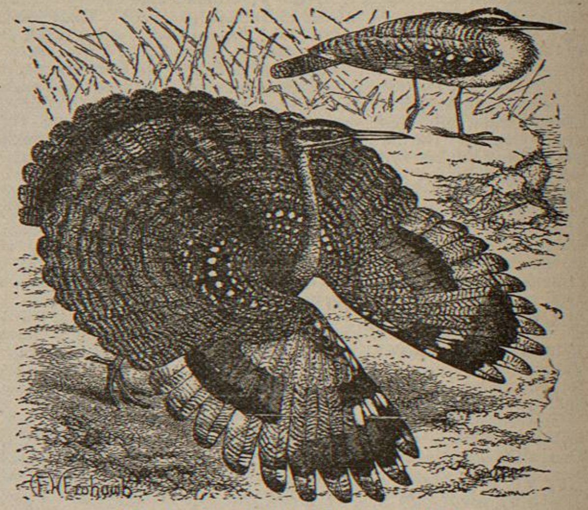

FIG. 1.—Sun-Bittern (*Eurypyga helias*).

few years later D'Aubenton figured it in his well-known series (*Pl. Enl.*, 782), and then in 1781 came Buffon (*H. N.*, *Oiseaux*, viii. pp. 169, 170, pl. xiv.), who, calling it "Le Caurâle ou petit Paon des roses," announced it as hitherto undescribed, and placed it among the Rails. In the same year appeared the above-cited paper by Pallas, who, notwithstanding his remote abode, was better informed as to its history than his great contemporary, whose ignorance, real or affected, of his fellow-countryman's priority in the field is inexplicable; and it must have been by inadvertence that, writing "roses" for "roseaux," Buffon turned the colonial name from one that had a good meaning into nonsense. In 1783 Boddaert, equally ignorant of what Pallas had done, called it *Scolopax solaris*,[7] and in referring it to that genus he was followed by Latham (*Synopsis*, iii. p. 156), by whom it was introduced to English readers as the "Caurale Snipe." Thus within a dozen years this bird was referred to three perfectly distinct genera, and in those days genera meant much more than they do now. Not until 1811 was it recognized as forming a genus of its own. This was done by Illiger, whose appellation *Eurypyga* has been generally accepted.

The Sun-Bittern is about as big as a small Curlew, but with much shorter legs and a rather slender, slightly decurved bill, blunt at the tip. The wings are moderate, broad, and rounded, the tail rather long and broad. The head is black with a white stripe over and another under each eye, the chin and throat being also white. The rest of the plumage is not to be described in a limited space otherwise than generally, being variegated with black, brown, chestnut, bay, buff, grey, and white—so mottled, speckled, and belted

[1] One species occurs in Baluchistan, which is perhaps outside of the Indian Region, but the fact of its being found there may be a reason for including that country within the Region, just as the presence of another species in the Jordan valley induces zoographers to regard the Ghór as an outlier of the Ethiopian Region.

[2] *Cf.* Gadow *Proc. Zool. Society*, 1882, pp. 409-421, pls. xxvii. xxviii.

[3] *Cf.* Gadow, *Proc. Zool. Society*, 1883, pp. 62-69, pl. xvi.

[4] According to Brisson (*Ornithologie*, ii. p. 460), this name was the invention of Réaumur. It seems to have become Anglicized.

[5] A name, says Buffon, intended to mean *Râle à queue*, that is, a tailed Rail.

[6] This figure and description were repeated in the later issue of this work in 1777 (i. pp. 679-681, pl. 1).

[7] Possibly he saw in the bird's variegated plumage a resemblance to the Painted Snipes, *Rhynchæa*. His specific name shows that he must have known how the Dutch in Surinam called it.

either in wave-like or zigzag forms as somewhat to resemble certain moths. The bay colour forms two conspicuous patches on each wing, and also an antepenultimate bar on the tail, behind which is a subterminal band of black. The irides are red; the bill is greenish olive; and the legs are pale yellow. As in the case of most South-American birds, very little is recorded of its habits in freedom, except that it frequents the muddy and wooded banks of rivers, feeding on small fishes and insects. In captivity it soon becomes tame, and has several times made its nest and reared its young (which, when hatched, are clothed with mottled down; *Proc. Zool. Society*, 1866, p. 76, pl. ix. fig. 1) in the Zoological Gardens (London), where examples are generally to be seen and their plaintive piping heard. It ordinarily walks with slow and precise steps, keeping its body in a horizontal position, but at times, when excited, it will go through a series of fantastic performances, spreading its broad wings and tail so as to display their beautiful markings. This species inhabits Guiana and the interior of Brazil; but in Colombia and Central America occurs a larger and somewhat differently coloured form which is known as *E. major*.

For a long while it seemed as if *Eurypyga* had no near ally, but, on the colonization of New Caledonia by the French, an extremely curious bird was found inhabiting most parts of that island, to which it is peculiar. This the natives called the Kagu, and it is

FIG. 2.—Kagu (*Rhinochetus jubatus*).

the *Rhinochetus jubatus* of ornithology. Its original describers, MM. Jules Verreaux and Des Murs, regarded it first as a Heron and then as a Crane (*Rev. et Mag. de Zoologie*, 1860, pp. 439-441, pl. 21; 1862, pp. 142-144); but, on Mr George Bennett sending two live examples to the Zoological Gardens, Mr Bartlett quickly detected in them an affinity to *Eurypyga* (*Proc. Zool. Society*, 1862, pp. 218, 219, pl. xxx.), and in due time anatomical investigation showed him to be right. The Kagu, however, would not strike the ordinary observer as having much outward resemblance to the Sun-Bittern, of which it has neither the figure nor posture. It is rather a long-legged bird, about as large as an ordinary Fowl, walking quickly and then standing almost motionless, with bright red bill and legs, large eyes, a full pendent crest, and is generally of a light slate-colour, paler beneath, and obscurely barred on its longer wing-coverts and tail with a darker shade. It is only when it spreads its wings that these are seen to be marked and spotted with white, rust-colour, and black, somewhat after the pattern of those of the Sun-Bittern. Like that bird too, the Kagu will, in moments of excitement, give up its ordinary placid behaviour and execute a variety of violent gesticulations, some of them even of a more extraordinary kind, for it will dance round, holding the tip of its tail or of one of its wings in a way that no other bird is known to do. Its habits in its own country were described at some length in 1863 by M. Jouan (*Mém. Soc. Sc. Nat. Cherbourg*, ix. pp. 97 and 235), and in 1870 by M. Marie (*Actes Soc. Linn. Bordeaux*, xxvii. pp. 323-326), the last of whom predicts the speedy extinction of this interesting form, a fate foreboded also by the statement of Messrs Layard (*Ibis*, 1882, pp. 534, 535) that it has nearly disappeared from the neighbourhood of the more settled and inhabited parts.

The internal and external structure of both these remarkable forms has been treated in much detail by Prof. Parker in the Zoological *Proceedings* (1864, pp. 70-72) and *Transactions* (vi. pp. 501-521, pls. 91, 92; x. pp. 307-310, pl. 54, figs. 7-9), as also by Dr Murie in the latter work (vii. pp. 465-492, pls. 56, 57), and the result of their researches shows that they, though separable as distinct Families, *Eurypygidæ* and *Rhinochetidæ*, belong to Prof. Huxley's *Geranomorphæ*, of which they must be deemed the relics of very ancient and generalized types. Their inter-relations to the *Rallidæ* (RAIL, vol. xx. p. 222), *Psophiidæ* (TRUMPETER, *q.v.*), and other groups there is not space here to consider, any more than there is to speculate on the bearings of their geographical position. It is only to be remarked that the eggs of both *Eurypyga* and *Rhinochetus* have a very strong Ralline appearance—stronger even than the figures published (*Proc. Zool. Society*, 1868, pl. xii.) would indicate. (A. N.)

SUNDA ISLANDS, the collective name of the whole series of islands in the East Indian Archipelago which extend from the peninsula of Malacca to New Guinea. They are divided into the Great Sunda Islands—*i.e.*, Sumatra, Java, Borneo, Celebes, Banca, and Billiton, with their adjacencies—and the Little Sunda Islands, of which the more important are Bali, Lombok, Sumbawa, Flores, Sandalwood Island, Adanara, Solor, Savu, Pantar, &c.

SUNDA STRAIT is the channel separating Sumatra from Java, and uniting the Indian Ocean with the Java Sea. It is 15 miles broad between the southmost point of Sumatra and the town of Anjer in Java. Right in the middle is the low-lying well-wooded island of Dwars in den Weg, otherwise Middle Island or Sungian. In 1883 Sunda Strait was the scene of the most terrific results of the eruption of Krakatoa, a volcano on the west side of the strait. The greater part of the island of Krakatoa was destroyed and two new islands, Steers Island and Calmeyer Island, were thrown up.

SUNDARBANS. See GANGES, vol. x. p. 68.

SUNDAY, or THE LORD'S DAY (ἡ τοῦ ἡλίου ἡμέρα, *dies Solis*; ἡ κυριακὴ ἡμέρα, *dies dominica*, *dies dominicus*[1]). According to all the four evangelists, the resurrection of our Lord took place on the first day of the week after His crucifixion (ἡ μία [τῶν] σαββάτων: Matt. xxviii. 1, Mark xvi. 2, Luke xxiv. 1, John xx. 1; πρώτη σαββάτου: Mark xvi. 9), and the Fourth Gospel describes a second appearance to His disciples as having occurred eight days afterwards (John xx. 26). Apart from this central fact of the Christian faith, the Pentecostal outpouring of the Spirit, seven weeks later, described in Acts ii., cannot have failed to give an additional sacredness to the day in the eyes of the earliest converts.[2] Whether the primitive church in Jerusalem had any special mode of observing it in its daily meetings held in the temple (Acts ii. 46) we cannot tell; but as there is no doubt that in these gatherings the recurrence of the Sabbath was marked by appropriate Jewish observances, so it is not improbable that the worship on the first day of the week had also some distinguishing feature. Afterwards, at all events, when Christianity had been carried to other places where from the nature of the case daily meetings for worship were impossible, the first day of the week was everywhere set apart for this purpose. Thus Acts xx. 7 shows that the disciples in Troas met weekly on the first day of the week for exhortation and the breaking of bread; 1 Cor. xvi. 2 implies at least some observance of the day; and the solemn commemorative character it had very early acquired is strikingly indicated by an incidental expression of the writer of the Apocalypse (i. 10), who for the first time gives it that name ("the Lord's day") by which it is almost invariably referred to by all writers of the century immediately succeeding apostolic

[1] The Teutonic and Scandinavian nations adopt the former designation (*Sunday*, *Sonntag*, *Söndag*, &c.), the Latin nations the latter (*Dimanche*, *Domenica*, *Domingo*, &c.).

[2] From an expression in the Epistle of Barnabas (c. 15), it would almost seem as if the ascension also was believed by some to have taken place on a Sunday.