contained a fine living *Panthalis*, which was successfully transferred to a small tank provided with a supply of the fine mud in which the animal lives. This worm has been kept under the closest observation by Mr. Watson and his son during the whole daytime and part of the night for the past week, and their care and enthusiasm have been rewarded by the collection of a number of drawings, photographs, and notes of the appearance and movements of the animal. During that time the *Panthalis* has deserted its old tube, and has formed a new one in the mud, fortunately using the glass of the tank for part of one side, so that the processes of scooping out the mud and of putting on the lining of mucous threads, and the various movements of the animal, have been readily enough seen—if one does not mind the inconvenience of lying for hours in a cramped position on the damp concrete floor of the aquarium room. The worm, and Mr. Watson, are still alive and at work, and we may expect a detailed account of their mutual labours from the latter when his observations are completed. W. A. HERDMAN.

Port Erin, August 31.

Symmetry of "Aurelia aurita."

DURING the last few months I have seen countless thousands of living specimens of *Aurelia aurita*, and have paid special attention to abnormal varieties. I have found not only such as have throughout the five-fold symmetry, seen by Mr. Unthank at Brightlingsea, as named in NATURE for August 22, but have with me on the *Glimpse* specimens stained and mounted as lantern slides having entire three-fold and entire six-fold symmetry, and one in which it is partially two-fold. I think it may be said that in Suffolk and Essex, a few such abnormal varieties occur per thousand of the normal. An imperfect four-fold symmetry is much more common. H. C. SORBY.

Yacht *Glimpse*, Burnham, Essex, August 31.

MARS AS HE NOW APPEARS.

STATISTICS are looked upon, as a rule, as hateful things, but nevertheless it would be interesting to know how many people out of the millions who walk this globe will turn at this period a telescope, however small it may be, in the direction of the planet Mars, which is shining so brilliantly in our eastern heavens. Times there were, no doubt, as for instance in the early Babylonian and Egyptian civilisation, when Mars was more generally the subject of scrutiny than to-day, but then the appearance of this intermittent and gradually brightening object made far different impressions on the minds of those early observers. Early it was that the peculiar coloured rays cast by his shining surface on this earth were first remarked. He was known to the Greeks and Hebrews as the fiery planet, and in Sanskrit he was referred to as like "burning coal."

To-day, however, the case is quite different. Many there are who may happen to notice an object more brilliant than usual in the heavens, and make some brief allusion to the fact, and trouble himself or herself no more about it, but it is to the increasing few that his appearance is of the greatest interest. To those who have once made use of even a small telescope to observe the planets, the fact that the nearest, and, it may be added, the most interesting, of them, namely Mars, is approaching us day by day, will be certain to raise a strong desire to catch another glimpse of his disc under such favourable conditions.

So much has been written about the markings of his surface, which represent huge areas of water and land, to say nothing of the most curious network of canals, that reference only to the very recent work on them will here be dealt with.

A few brief remarks, before proceeding, as to the position of the planet in the heavens, and to the approaching opposition.

Firstly, as to position. At the present time Mars is moving easterly in the heavens, situated at the southernmost corner of the constellation of Aries. By September 15 he will have reached his most eastern point; and from that time he will turn in his loop, and continue his apparent journey in the westward direction, passing into the neighbouring constellation of the Fish.

The following table will perhaps be useful to those who have not the data at hand. The times referred to are Greenwich mean time.

Date.	R.A. Noon.	Decln. Noon.	Diam.	Rises.	Transit.	Sets.
	h. m. s.	° ′	″	h. m.	h. m.	h. m.
Sept. 8 ...	2 14 36	9 37 N	21·8	8 6	14 59	21 52
18 ...	2 15 48	9 49	23·4	7 30	14 24	21 18
28 ...	2 11 15	9 42	24·9	6 46	13 40	20 34
Oct. 8 ...	2 1 30	9 16	25·6	5 59	12 50	19 41
18 ...	1 48 38	8 41	25·7	5 10	11 58	18 46
28 ...	1 35 38	8 9	24·6	4 21	11 6	17 51
Nov. 7 ...	1 25 29	7 51	22·8	3 29	10 16	16 55

The fact of Mars being the first superior planet reckoning from the sun, his opposition, or in other words, the position in which he is to be found in his orbit when on the same side of the sun as the earth, with all three bodies in a straight line, affords us a good opportunity for studying his surface features. Owing, however, to the non-concentricity of planetary orbits, his distance from the earth at these times is always varying, and this explains why some oppositions are more favourable for observation than others. The nearest approach of Mars to the earth may be approximately given as 35,000,000 miles, his distance at the coming opposition exceeding this number by about 5,500,000 miles.

In consequence of these varying distances, the apparent size of his disc is undergoing changes; thus the conditions at each succeeding opposition are rarely the same.

That the coming opposition is a very favourable one, can be seen from the table given below, and that it will be more favourable than that of 1892 for observers on the northern hemisphere is due to the planet's more northern declination at this period, bringing him above the mists which spoil good seeing near the horizon.

Date of Opposition.	Semi-diameter.
	″
1862 October 5	10·8
1869 February 13	8·2
1873 April 27	9·7
1877 September 5	14·7
1881 December 26	9·2
1884 January 31	8·3
1888 April 10	9·2
1892 August 13	14·7
1894 October 20	12·9

Let us turn our attention now to the observations that have been made up to the present time, and see what has as yet been learnt from a study of the Martian surface. The work to which we are now about to refer hails from the Lowell Observatory, Flagstaff, Arizona, and the observations have been and are continually being made by its founder, Mr. Percival Lowell, who has set his observatory on this spot for the single purpose of carefully studying the surface of Mars during this period of opposition. The old saying that the early bird gets the first worm, can be applied with some force to Mr. Lowell, for he has been rewarded with ample satisfaction for commencing his observations at such an early date. Indeed, perhaps the great value of this series of observations which he is making will be in its very length, for is he not, from a study of his own observations, watching attentively the various stages of a vast aquatic display which becomes more and more distinct the nearer the earth is approached, and therefore must be continually and for a long period observed?

At the commencement of the observations (May 31) the planet was 98,000,000 miles away, and his south pole was directed towards the earth at about 23½°, reaching a maximum dip of 24° on June 22, the disc appearing gibbous to the extent of about one-sixth.

Such being the conditions of seeing, one could look on the planet, so to speak, rotating under one, watching the snowy pole whirling, as a boy might look at his colour-striped top. The observations were thus limited more or less to the southern hemisphere, but occasional glimpses carried one up as far as latitude 40° north The regions most referred to in the observations were the Syrtis Major, all the region of the north pole, that about Solis Lacus, Lacus Phœnicis, and that a little more north of Mare Sirenum and Mare Cimmerium.

The rapid diminishing of the huge snow-cap, which at this period of the planet's summer has been taking place very rapidly, has perhaps been the most prominent feature of this series of observations. Mr. Lowell has noticed a decrease in its diameter of about 7° in as few as fifteen or sixteen days, by no means a small diminution considering the length of the period.

A further very prominent feature of this polar cap is the apparently perfectly elliptical outer edge, which means that the boundary is in reality circular. The narrow dark streak girdling it, and of nearly a uniform breadth, is "clearly water at the edge of the melting snow, a polar sea in short."

On the snow-cap itself, in the region of the great bay situated south, Hellas and Chersonesus, several extremely brilliant parts have been observed, the appearance and behaviour of which have led to the conclusion that we are here dealing with mountains. These at present are accounted for by supposing that the rotation of the planet brings them into such positions that the sun's light can be reflected by them in the direction of the earth, just as a beam of sunlight can be thrown by means of an ordinary mirror. What has led us to believe them to be mountains is the constancy of the positions in which they are, for not only have they been several times observed at this period of opposition, but Mitchell in 1845, in a drawing made at Cincinnati on August 30, and Green in 1877, have both recorded them and in the same position.

Another marking on this polar cap, referred to as "the great rift," seems to be a very conspicuous object. The best time for observing it is when it is, so to speak, end on, or on the central meridian of the planetary disc. Mr. Lowell has likened it to "a huge cart-track coming down to one over the snow," and he has estimated its size as 220 miles broad and 1200 miles in length.

An observation, which is of more importance than one is at first likely to admit, is that concerning the *indefinite* characters of all the markings between the sharp boundary of the snow-cap and the *definite* characters of the continental coast-line. The coast-line was "most salient and clear cut on the western side of the Hour-Glass Sea (Syrtis Major or Mer du Sablier). To the eastward the coast lay in general direction straight, approaching the pole as it stretched eastward. It was indented by numerous bays, but destitute of those comet-tail peninsulas so generally observed connecting it to the chain of islands south. All of these islands, Hellas, Ausonia, and the rest, were vague, without definite contours, and lapsed imperceptibly into the surrounding seas. Even in colour they were less decided than, though of much the same tint, as the continental areas."

With such facts before us, it is hard to believe that we are not observers of a great inundation, which obliterates, or nearly so for a time, all landmarks lying anywhere in the region 20° or more south of the equator. The source of this flood would of course be the rapidly melting snow, and the great volume of water now liberated from the solid form, and forming at the boundary of the cap the dark narrow belt, would be ample to account for the disappearance of islands, blurring of coastlines, and such-like phenomena. Certain are we that these landmarks are *there*, and the only justifiable cause of their dimness of outline and colour is the hypothesis of their partial and sometimes total submersion.

An observation of great interest may be mentioned here, as it deals directly with the great variation of surface markings we have referred to above. The most conspicuous object on the planet's surface at the present time is the large black gulf bounding the melting snow, and situated due south of the Hour-Glass Sea, or Syrtis Minor. This, as Mr. Lowell has previously described it, is clearly water at the edge of the melting snow, or, in other words, a polar sea. On June 4 the polariscope was brought to bear on this gulf by Prof. Pickering, with the result that it was declared to be water, just as the canal in the same region, running north from it, was concluded to be of this substance. This observation simply verified what had previously been thought to be the case from its general appearance and colour; but another examination, at a later date, represented the matter in quite a different light. On July 9 "no trace of the polarisation in the dark spot could be detected," and a more minute examination of the colour of this region showed it to be of a "rich chocolate-brown tint, differing entirely in colour from the bluish-grey regions to the north of it." This reads somewhat different from Lowell's observation on July 9: "Bay a deep blue, looks just as deep water does." Prof. Pickering is of opinion that as the colour of the grey regions does not, he thinks, represent water, he is led to conclude, as far as his observations at present go, that the "permanent water area on Mars, if it exists at all, is extremely limited in its dimensions." This favours to a considerable extent the hypothesis of an inundation.

Let us consider for a moment the observations relating to the appearance of the channels at this time. These, at this season of the Martian southern hemisphere, are generally not so easy of observation, but Mr. Lowell has been able to make out several of them. Those most generally seen were Cerberus to the north of Mare Cimmerium (on June 9 glimpsed as double), Eumenides, Gigas, Titan, Gorgon and Sirenius, all of which lie just to the north of the Mare Sirenum, and at a later date he has seen some in the region of the Lake of the Sun (Solis Lacus), namely Phasis, Eumenides, and Agathodæmon. These channels, including one or two others which we have not mentioned in the above list, have, we may say, the greatest southern latitude, or lie nearest to the south pole, a fact which may or may not be insignificant.

Of course the great inclination of the pole of Mars towards us, renders those on the northern hemisphere more difficult of observation, so that our information is to a great extent restricted. Nevertheless, one is inclined, from Mr. Lowell's drawings, to look upon the channels simply as the watercourses caused by the inundation of the sea on to the land, commencing naturally at the lowest levels, and of course at the water's edge. Out of the nine drawings which he gives, illustrating the positions of the canals observed, eight of them show the majority of the canals in connection with the southern seas, while there is only one instance of a channel not so connected, and that a very short one. This is as it should be if the channels are, so to speak, overflow courses, and accounts also for the invisibility, or at any rate the difficulty of observation of the channels, as a whole, about this time. As the polar cap ceases to melt, the channels should then be at their fullest, and therefore easily visible. The absence of cloud on the planetary surface about this time shows that the aqueous circulation is almost totally brought about by this flood season.

Whatever may be the cause of these channels and

their duplicity at times, cannot be dwelt on here; but that they are the results of a great inundation, seems to be the conclusion which is most compatible with recent observation.

A further fact which has recently attracted particular attention is the frequent observation of bright projections on the terminator of the planet's disc. It may be here simply mentioned that the observations as yet seem to point to the presence of high mountains as the cause of these bright markings.

A discussion of this question will be dealt with, however, in a future article, which will contain a detailed account of the work up to the present time.

Such, then, are some of the facts which have been brought before us by the Arizona observations. Observations at other observatories, such as that of Juvisy, &c., are also at hand, but the weather seems to have been hard on these eager watchers, so the observations are very few. The surface of Mars is still a puzzle to be unravelled, and there are many who are employed in the fascinating work of solving it. One may repeat, what has often been stated before, that in the study of planetary details, the aperture or the size of object-glass is not the most important function for good observations. A keen and patient observer sitting at the eye-piece of a comparatively small equatorially-mounted telescope, if he makes his observations carefully and with due regard to atmospheric conditions for good seeing, can do more useful and valuable work than one who has a large aperture at his disposal, and employs it indifferently. For Martian detail, Mr. Lowell puts the observer first, then the atmosphere, and lastly, the instrument, as the order of weights to be given as factors of a good observation. W. J. LOCKYER.

Note.—In my article on "The Discs of Jupiter's Satellites," which appeared in a previous number of this journal (August 2, p. 320), the table, giving the measurements of the position angle of the 1st satellite, requires a slight alteration, owing to a printer's error in that number of *Astronomy and Astrophysics* from which the table was taken. In the column indicating the initials of the observers, the following measures, 1, 3, 5, 7, 9, 11, ought to be attributed to Prof. Pickering, and the rest to Mr. Douglas. This alteration makes no change in the text necessary, as it was only stated that there was "a mean personal correction of about 7°·1," which, in the light of the revised column, still holds good. The correction, with one exception, simply reverses the names of the observers in each case. W. J. L.

THE ARCHOPLASM AND ATTRACTION SPHERE.

PLATNER in 1886, when dealing with the spermatocytes of helix, showed that the great "nebenkern" in these elements was derived after each division from a coalescence of the spindle-fibres. At the same time he pointed out in the interior of the structure bright refractive points answering in every way to what was then known about the centrosomes. Some time afterwards F. Hermann, in an exquisite description of the karyokinetic process in the spermatocytes of salamander, successfully homologised the great "archoplasm" (as he termed the nebenkern of these cells), on the one hand with Platner's nebenkern, and with the sphere-attractive and archoplasm of Van Beneden and Boheri on the other. I subsequently drew attention to the fact that this archoplasm in the salamander arose by a collection of the spindle-fibres precisely in the same manner as that of helix, *i.e.* these structures (attraction-spheres) in widely separated groups present precisely similar constituents, and arise in a precisely similar way.

The clear appreciation of the mutual equivalence of these bodies is of considerable value, as it paves a way towards the systematic splitting up of a whole group of structures present in reproductive cells, which had all previously been loosely grouped under the head of nebenkerns. Nevertheless, if we accept it, a certain difficulty arises, to which I referred briefly at the time, and to which Dr. Neves has since called my attention in an interesting letter from Kiel:—If the archoplasm of the spermatocytes with its inner constituents is the homologue *in toto* of the attraction-sphere when at rest (Fig. 3), or during the initial phases of mitosis, what is to be said of it in the later phases of this process?

In the attraction-sphere as first described and ordinarily understood in ascaris, the centrosomes, with their light-surrounding zone, occupy the middle of an extended archoplasm which divides with the centrosomes during the course of the mitotic change, but in the case of salamander the archoplasm remains undivided as a rule; and its whole mass is used up in the construction of the spindle, the centrosomes appearing at the apices of the figure related to a radiation of the non-archoplasmic and external protoplasm. Now when the karyokinesis is completed, and the daughter nuclei formed, the centrosomes can be found at the remote sides of the nuclei (as in Fig. 4, *c*, one-half of a dividing spermatocyte of a rat), but the two new archoplasmic masses are being regenerated on each side of the division plane (as in the rat, Fig. 4, *b*). These masses become completely formed, but in consequence of their position are destitute of centrosomes, which must acquire a secondary connection with them; so that at this phase the sphere is divided into two parts in each cell, that which attracts (centrosomes) being at one side of the nucleus, that which is regarded as primarily attractive (the archoplasmic portion of the kytoplasm) on the other. In salamander these anomalous conditions eventually become righted by the centrosomes wandering round the nuclei into the archoplasm.

Turning, however, to a still higher type of vertebrates, the Mammalia, a short time ago I found in the spermatocytes of various forms, besides other and well-known accessory bodies, a great lightly staining nebenkern (archoplasm), which can be determined as arising during the spermatogenesis by a coalescence of the spindle-fibres (Figs. 1, 2, *a*), so that we must regard this body as having the same value as the nebenkern in Amphibia, in Helix, in Echinoderms, or that it is the archoplasmic portion of the attraction-sphere; but at no time, either at rest or during active mitosis, does it contain within its mass the centrosomes! In the resting spermatocytes of the rat (Fig. 2) these bodies lie quite outside the archoplasm (Fig. 2, *c*), they become duplicated, and enter into the formation of a spindle without any connection with the archoplasm (Fig. 1, *c*), which passes further away, and ultimately degenerates (Fig. 1, *a*). The spindle-fibres are constructed anew out of the kyto- and superficial nuclear-plasm, and the mass of substance thus utilised is collected on either side the division plane as the archoplasmic bodies of the daughter cells.

The archoplasm, then, has no permanent existence in these cells, and is of no immediate consequence in the formation of the spindle. The fact, however, that the transitory body formed in mammals from each new crop of spindle-fibres, after each division (Fig. 4) rapidly dissolves and reincorporates itself into the surrounding kytoplasm, is distinctly favourable to the view now gaining ground, that the spindle has a kytoplasmic origin.

From all this it will be seen that we cannot regard the archoplasmic portion of the sphere as a permanent organ of the cell any more than the ripples wind produces are the permanent features of the surface of a pond.

On the other hand, all the more recent investigations concerning normal or karyokinetic propagation of cells, whenever sufficient pains have been taken to insure good