several occasions the two orbits approached so closely that, had the earth and the comet arrived simultaneously at the point of least distance, the former would have passed through the outer portion of the comet's head. At the time of the comet's first return after discovery, in 1832, there was a great scare among the inhabitants of southern France, due to a false rumor of an impending collision. In reality earth and comet never came closer together than 15,000,000 miles, since the latter had passed the critical point about a month before the earth arrived there. On its third return, in 1846, the comet divided into two while in full view. When the twin comets were seen again in 1852 they had separated from each other about 1,500,000 miles. Since then nothing has ever been seen of them, though they should in the meanwhile have reappeared no less than eight times, and repeatedly under favorable conditions of visibility. On the night of November 27, 1872, while the earth was passing the old path of the lost comet, she encountered a most magnificent display of meteors. The same phenomenon was repeated, though with less splendor, on similar occasions in 1885 and 1892. In this case, a collision was averted by the fact that the comet failed to last long enough!

But suppose a comet does collide with the earth! What will happen? No mortal knows, and the writer is not anxious to find out by his own experience. All would depend upon the mass of the comet, the state of aggregation of its matter, the velocity with which the two bodies came together, and the angle of impact. Matters would likewise differ greatly accordingly as the blow would be central or glancing. As it is not feasible to discuss all the possible cases, we will take the most serious, which undoubtedly would be a central collision, with both bodies moving in the same or in opposite directions.*

The gaseous constituents of the comet's head would probably be stopped by the resistance of our atmosphere before penetrating very far into it. But, as thereby their motion would be converted into heat, they might possibly make it uncomfortably warm for us. But as their density is so very small and only a minute fraction of the comet's mass could come into contact with our diminutive earth, the effect might, after all, be not very disastrous.

The same, however, can not be said of the smashing into the nucleus. Suppose the latter had a mass equal to only one five-hundred-thousandth part of the earth's mass. This is relatively so small that 6,130 comets could be made out of our little moon. Nevertheless it would be equivalent to an iron ball nearly 84.5 miles in diameter, weighing something like 12,000,000 tons. Since the comet would hardly have a velocity of less than 26 miles per second, matters would be bad enough, even in the most favorable case—that is, if the comet would overtake the earth—as the latter's mean orbital velocity of 7.5 miles per second. In order to get at least some idea of what this would mean, let us make a comparison:

A shell weighing half a ton fired from a United States 13-inch gun (1898) with a velocity of only 2,100 feet per second, penetrates a plate of solid steel (not armor) 27 inches thick, if the latter is placed close to the muzzle of the gun. The energy of the projectile works out to be 1,102,500 tons. The effect of the same shell coming with a velocity of 7.5 miles per second would be 355 times as great, and if the projectile had the supposed weight of the comet's nucleus, its striking energy would be more than 8,600,000,000 tons. Of course, the writer knows that cometary nuclei can not be solid, were it only for the fact that they expand and contract by thousands of miles, as is the case in Enke's comet; but the combined energy of the meteors forming it would be diminished only by the amount to be deducted on account of the increased friction in our atmosphere due to a greater surface presented by innumerable small particles instead of that of a solid ball having the same aggregate mass. What the mechanical effect of such bombardment would be nobody can foretell. Nor would it matter much, because the heat generated by the impact, if expressed in "calories,"* would have to be written: 21,053 followed by seventeen zeros! This quantity of heat would be sufficient to raise the temperature of more than 5,000,000 cubic miles of water from the freezing to the boiling point, an amount of water which could cover the whole surface of the earth to a depth of 84.5 feet. No living being would survive the corresponding rise in temperature.

But results would be vastly worse if earth and comet would come together on their centre line, moving in opposite directions. In this case they would collide with a velocity of 44.5 miles per second, and as the striking energy increases with the square of the velocity, the effects of head-on collision compared with those of a rear collision would be as 44.5-2 to 7.5-2, that is about thirty-six times more serious. In view of these figures, such questions as whether the attraction of the comet would cause a disastrous flood prior to the collision, or what would be the composition of the atmosphere after the event, etc., have little significance. A head-on collision would simply mean the end of the world as far as the human race is concerned.

Now, what are the chances of so terrible a catastrophe As stated before, it is bound to happen, provided the earth lasts long enough and comets do not become extinct. As to each individual comet striking the earth, the chances are, according to Arago, as 1 to 281,000,000. There need, therefore, be no more fear of such collision than of the end of the world in general. The latter has been prophesied by our Divine Lord, and its coming is infinitely more certain than a comet's smashing into the earth, still nobody seems to worry very much about it. And, indeed, why should we worry concerning the end of the world, knowing, as we do, that for each one of us individually the moment of our death will be the end of the visible world for us? Why fear a comet, when we know that it takes infinitely less to snuff out the candle of our life than a collision between the earth and a comet? It would be infinitely better to be always prepared to die, than to be afraid of it, and for the rest trust in God, without Whose knowledge and consent no harm can befall either the whole earth or the lowliest of its inhabitants.

*Whether there is any probability that the angle between the directions of the two motions would (or even could) be absolutely zero, is a debatable question. As regards the following conclusions, the introduction of a small angle would only complicate calculations without materially affecting the results.

*A "calorie" is the amount of energy required to raise the temperature of 1 kilogram of water (2.2 pounds) 1 deg. centigrade (1.8 deg. F.).

Some Data Regarding Halley's Comet

As a few data regarding Halley's comet will probably be welcome to many readers, they are added as an appendix.

Halley's comet received its name in honor of the famous English astronomer Edmund Halley (1656-1742), who, at the time of its appearance in 1682, calculated its orbit and, after establishing its identity with the comets of 1531 and 1607, pronounced it to be a periodic comet, predicting its return for 1759, or the end of 1758. The prediction came true. The comet passed perihelion on March 13, 1759, only thirty-two days earlier than had been computed by the French mathematician and astronomer Clairaut. Though Halley had died in 1742, posterity did not forget his claim on the comet, which was thenceforth called "Halley's comet."

Two English astronomers of the present time, Messrs. Cowell and Crommelin, have, by patient research and laborious calculations, traced the history of our comet as far back as the year 87 B. C. For every one of the twenty-five returns postulated by the period of the comet since 87 B.C., they found historical proofs. Their dates are as follows:

Year.	Perihelion passage.
87 B.C.	Aug. 15
12 B.C.	Oct. 8
66 A.D.	Jan. 26
141 A.D.	Mar. 25
218 A.D.	April 6
295 A.D.	April 7
373 A.D.	Nov. 7
451 A.D.	July 3
530 A.D.	Nov. 15
607 A.D.	Mar. 2
684 A.D.	Nov. 26
760 A.D.	June 15
837 A.D.	Feb. 25
912 A.D.	July 19
989 A.D.	Oct. 9
1066 A.D.	Mar. 27
1145 A.D.	April 6
1222 A.D.	Sept. 10
1301 A.D.	Oct. 23
1378 A.D.	Nov. 9
1456 A.D.	June 8
1531 A.D.	Aug. 26
1607 A.D.	Oct. 27
1682 A.D.	Sept. 15
1759 A.D.	Mar. 13
1835 A.D.	Nov. 16
1910 A.D.	April 19

The present appearance is, therefore, the twenty-seventh of which we have certain knowledge. There can be no doubt that the history of the comet could be traced much farther back by means of the cuneiform inscriptions of Assyria, but this difficult piece of work seems to have not yet been attempted.

While the mean period of Halley's comet as given in astronomical boks is 7.37 years, the shortest interval between two successive perihelion passages has hitherto been 74.88 years (1607-1682) and the longest 79.37 years (451-530). All records will, however, be broken by the present visit of the comet. If it passes perihelion on April 19, 1910, only 74 years and 155 days will have elapsed since its passage in 1835! These inequalities are due to the perturbations in the comet motion caused by the attraction of the planets, especially of Jupiter and Saturn.

At perihelion (point at least distance from the sun) Halley's comet is, on the average, only 54,000,000 miles from the centre of the sun, while at aphelion (point of greatest distance) it is 35.4 times as far as the sun, or, in round figures, 3,288,000,000 miles, which is about 496.4 million miles—or more than five times the distance between sun and earth—beyond the orbit of Neptune, the farthest known planet.

At its present return, the comet was first discovered by Doctor Dolf, director of the astrophysical observatory on the Konigstuhl near Heidelberg, Germany. Two photographic plates exposed to the computed place of the comet in the morning of September 11, 1909, showed the visitor. On the following day Lick Observatory, California, and Helwan Observatory, Egypt, likewise obtained photographs of the comet, which was then too faint an object to be visible, even in the largest telescopes. On September 15, however, it was for the first time observed visually with the 40-inch refractor of Yerkes Observatory, Wisconsin, by Professor Burnham, as a very faint object. Since then it has slowly grown brighter, at times more rapidly than was anticipated.

Several authorities were of the opinion that the comet could be seen by means of field-glasses about the beginning of February, if not earlier. This appears to be not the case. At Manila Observatory the comet was first seen with the 19-inch euatorial on November 25, 1909. It was again picked up in the same telescope in the evenings of January 29 and 30. On the latter occasion it was a relatively easy object with the 5in. finder attached to the larger instrument, but appeared to be below tenth magnitude.

In view of these facts, the reader will probably not be too much surprised if, on reading the following statements concerning the phenomena to be expected, he finds only vague language. Astronomical positions are expected to be given at least down to minutes of arc, and the moment of a celestial occurrence to fractions of a minute of time. He may remember the story of the discovery of Neptune. Though this planet had never been seen consciously by human eyes (it had indeed been observed repeatedly, but always been mistaken for a star of ninth magnitude), its existence was deduced fro mthe small differences between the computed and observed places of the planet Uranus. From these perturbations the French mathematician Leverrier calculated the whereabouts of an unknown disturbing planet so accurately that Galle, at Berlin, found the latter on the night of September 23, 1846, within half an hour after commencing the search, and only 51' (a little more than 1.5 times the angular diameter of the sun) from the indicated place. But the same methods and the same genius applied to the computation of cometary motion are far from giving equally good results. Suffice it to mention only that the position of the centre of mass of a comet can not be determined as accurately as that of a planet, and of the mass of a comet we know practically nothing. Of a few of them, such as have come sufficiently close to the earth, we know a limit which their mass can not reach, but how indefinitely they may be below it, who can tell? If these facts are considered, the wonder is not that discrepancies exist, but that they are not vastly greater, especially if we bear in mind that in the case of Halleys' comet the difference between the longest known period of revolution and the present shortest one is only twenty days short of five full years.

After this aology for astronomical calculations (and incidentally for ourselves!) we venture to make the following statements:

1. The comet will probably reach eighth magnitude about the middle of February. A good pair of field glasses ought then to show it in the western sky, approximately 44 deg. east and 21 deg. north of the suns' apparent place. As the comet will set about three hours after the sun, the advent of darkness may be awaited.

2. During the first third of March it may become possible to see the comet with the naked eye. But this can not last very long, since on March 16 it will set about half an hour after the sun, being some 5.5 deg. north of it; whence it will be lost in the glow, unless very bright.

3. About March 23 sun and comet will be in superior conjunction, that is, as seen from the earth, both bodies will have the same right assension, the comet being beyond the sun and about 5.5 deg. north of it. Of course, there will be no possibility of seeing the former, owing to the glare of the latter.

4. Towards the middle of April the comet may be looked for in the morning sky, where it will rise before the sun, being 2.5 deg. south of the point of sunrise on April 15. It ought to be an easy object for the unaided eye. It will be noticed that, while in the west the comet appeared to plunge headlong toward the horizon, it is now backing into view, as the tail is always pointing away from the sun. For some five weeks the difference between the rising of the comet and sunrise will increase; but six days before inferior conjunction on May 19, it will again decrease until the comet is once more lost to view in the splendor of the sun shortly before conjunction.

5. According to the latest information at hand, the exact time of perihelion passage closest approach of the comet to the sun April 19.65 Greenwich time, which, in the dinary way of counting dates, is 11 o'clock 36 minutes a.m. of April 20, Insular time (hundred and twentieth meridian east of Greenwich).

6. After perihelion the comet will approach the earth very rapidly and, therefore, uickly increase in size until the time of inferior conjunction with the sun and shortest distance from the earth. At this time the apparent motion of the comet will be so swift that the latter will seem to pass through more than 45 deg. in right ascension in the short space of four days.

7. Earth and comet will be in heliocentric conjunction at 10 a.m. of May 10 (Insular time). Messrs. Cowell and Crommelin, of Greenwich Observatory, have calculated that the comet, as seen from the earth, will pass across the sun's disc nearly centrally, entering from the west and accomplishing the transit in about one hour. Though the sun will then be high in heaven in this part of the world, there is very little hope that the comet can actually be seen on the suns' disc. According to all that we know of the nature of comets, even their nuclei are not dense enough to intercept the sun's rays sufficiently to reveal the comet's presence between the sun and the eye of the terrestrial onlooker.

8. If the present appearance of Halley's comet rivals the former, the comet will be a magnificent object. As to the probable length of its tail, nothing can be stated. The greatest length on record was 60 deg. (in 1456); that is, two-thirds of the distance from the horizon to the zenith. Ho wclose to the sun the comet will be visible is likewise unknown. The great comet of 1882, for instance, was actually first discovered on the day of its perihelion passage, when only 2 deg. from the sun.

9. While before conjunction the comet preceded the sun in the morning, it will follow the same after this event and, therefore, may again be observed in the evening. But it will rise rapidly in the sky, tail foremost, and fade away very uickly, since it now not only recees from the sun, but also from the earth, comet and earth moving in almost opposite directions. Before the middle of June it will probably be lost to the naked eye; at the end of June field glasses will no longer sho wit; and at the end of July it will be invisible even in the largest telescopes. When, after about seventy-six years, Halley's comet will again appear to the eye of man, neither the writer of these lines, nor the vast majority of those for whom they are written, will gaze upon its weird but harmless beauty—for us the end of the visible world will have come.

Delays Upon Life's Road

There can be no time in the hearts of wives and mothers when patience and brave-heartedness are more difficult of attainment than during those lengthy seasons of inactivity which sickness often claims as her aftermath.

While acute pain, or danger holds sway, household matters fade into mere insignificance, but convalescence duly established, the neglected downstairs duties loom abnormally upon the invalid's mind, and she wonders again and again, how the house is getting on without her.

Thus, when her mind should be aiding the body's recovery by a complacent acceptance of the enforced rest, she thinks distractedly of the loneliness of her husband, who must surely be missing all the wifely attentions to which he has become accustomed, of the home depending upon a servant's care, and, if she be a mother, the remembrance of a hundred and one small necessities for her children's welfare will prevent the rest which nature is so urgently demanding.

It is certainly worrying to remember all these things, and it is but womanlike to do so.

But a realization of the fact that this "remembering" will seriously delay a return to health, coupled with the philosophical self-assurance that "What can't be cured must be endured," can prove a valuable antidote to the worry poison.

The amount we women worry, too, is nearly always out of all proportion to the cause.

The husband whose wife is laid aside rarely worries himself because just for a time he has to pour out his own tea or his dinner-table lacks its usual adornment of flowers.

As a matter of fact, he is likely quite unobservant of the latter omission.

As for the dust that you know by instinct that Ann or Eliza is daily overlooking, well a few inches more or less of that trying substance will be all the same a month or two hence, and, after all, the dusters will last a trifle longer!

The kiddies, too, will enjoy life none the less for being button or string short, therefore, unless you are strong enough to use a needle, do not examine their dress too critically when they run up to see you, but just cheer yourself with the reflection that when you are well again you can soon put all things to rights.

Where means will allow of the services of a paid housekeeper or where an obliging relative happens to be available, of course all these little difficulties are minimised, but in many cases neither the one nor the other is within the invalid's reach.

Often the rather morbid, but quite excusable feeling that she no longer "counts" in the household is answerable for the depression to which ill-health makes one such an easy prey; but depression is another of the foes to recovery, and must be suppressed, at all costs.

Everyone "counts" in this world, irrespective of circumstances, for personality makes itself felt from the invalid couch as in the palpitating ranks of battle, and the weakest woman may be a strengthening and encouraging force to those around her.

The illustration of this is often seen in those sad cases of chronic invalidism, where the wife or mother knowing that the comfort of the home will disappear if she does not see to things for herself, bravely takes up the daily responsibilities, managing moreover, by her wide, unselfish interests, to keep in touch with the outside world.

It is a fatal concentration of thought upon herself and her immediate surroundings that an invalid has to guard against; lose interest in other people, and other people will certainly, in time, lose interest in you.

And therefore, poor maimed and halt, however painful, however absorbing your complaint, however cleverly you may manage to retain the generalship of home, don't let yourself or your own affairs fill your mind to the exclusion of all else, of all thought of that stream of strenuous life just outside your own "back-pool" of existence.

Brave-heartedness and gentleness and patience are undeniable virtues, yet possessing all these, if you lack the power of entering sympathetically into the plans and affairs of others, the atmosphere of dullness often associated with an invalid's presence will emanate, too from your.

APPETITE OF BIRDS

The wood pigeon has, all along its history in association with agriculture, been characterised as a bird of voracious appetite, but it has not a more voracious appetite than many of its woodland companions. It is certainly, however, a great eater. Packed in the crop of one has been found 800 grains of wheat, while the toll taken by another from a field of peas at one diet was 600 peas. One hundred and eighty beechnuts and 60 acorns were tit-bits chosen from the menu cards by others, while one shot on the estate of Park, Banffshire, had managed to stow away 968 grains of barley and 20 grit stones. Large as this appetite and capacity may seem, it is, however, eclipsed by little robin redbreast that haunts our homesteads in the country all the year round. As regards the amount of its daily diet, it has been made the subject of special experiment. For three weeks one was caged and weighed at the same hour every morning. It was found to weigh about one ounce and in order to keep it up to this weight it required two and a half ounces of food per day. When its feed for the day consisted of earth worms, the little gourmand dispatched as many as extended end on end for fourteen feet. Had humanity been endowed with a similar appetite, a man of twelve stones weight, in order to equal robin's feat would have required half a large bullock per day. There is an authentic instance in which no fewer than 1225 "leather-jackets," most destructive larvae, were taken from the crop of a single pheasant. Though the heron is a bulky bird its average weight is not over four pounds, yet one was found to have swallowed two trout weighing 2 lb. and 1¼ lb. each. Another had dined on seven small trout, a mouse, and a thrush.

The soul of the poet is like a mirror of an astrologer; it bears the reflection of the past and of the future, and can show the secrets of men and gods; but all the same, it is dimmed by the breath of those who stand by and gaze into it.—Ariadne.

Pity and need
Make all flesh kin. There is no caste in blood,
Which runneth of one hue, nor caste in tears
Which trickle salt withal.
. . . . Who doth right deeds.
Is twice born, and who doth ill deeds vile.
Edwin Arnold.

We realise liberty of conscience grandly in theory and in the laws of the nation, but when it comes to individual feeling and daily life it is still a hard doctrine for the majority of people to put into practice.

Read the best books. It will be time enough to read the third or fourth rate books when you have mustered all the first rate. Read above you. We should choose our books as we do our lovers—above us, far enough just to inspire and elevate us.—L. Moss.

Do not waste life in framing theories of the beautiful.—H. P. Liddon.

Dance of the Bedouins

In the quarterly statement of the Palestine Exploration Fund, Mr. W. E. Jennings-Bramley continues an interesting account of the Bedouin of the Sinaitic Peninsula. The following passage occurs:

"The nearest approach to general social intercourse between men and women takes place during the Rubia. At this season of the year—the only one when many collect together in one place—the Dahieh is danced or rather sung in the evenings. The chorus, which is composed of as many men of the tribe as choose to join in, stands in a long row. It is their business to beat time, and as they stand they step simultaneously forward, bending as they clap their hands rhythmically. A deep guttural sound marks the first cadence. When they have thus given the time and rhythm, one of their number begins a chant in honor of heroes of the past, or improvises verses in which he celebrates the deeds of valor of someone present, perhaps. At the end of each verse the chorus repeat a kind of refrain. Every allusion is greeted by the women gathered together by themselves in a tent close by with the shrill tremulous "zaghareet," which with them is equally a sign of mourning or rejoicing.

Suddenly a girl (the Hashi) appears on the scene. She is closely veiled, and stands, perhaps, thirty yards away in front of the men. She pauses an instant sword in hand, just time enough to feel the rhythm of the song, and then advances quickly, holding the sword lengthways in both her hands. Her body sways in time to the rhythm of words and beats of hands. The men are gradually approaching her, and when they reach her the chant becomes louder and her movements more decided. She now retreats slowly, repelling them with her sword, sometimes bending to the right, sometimes to the left, but always following the rhythm in every movement. When thus she has been driven back to the limits of the ground, there is a short lull while the men walk back to their original starting point, and the whole thing begins again.

The Hashi will sometimes dance longer than her audience desire, or her performance may not satisfy them; in either case, one of the men kneeling down, goes through the motion of shooting at her, pointing at her with the forefinger of the left hand and snapping the thumb and third finger of the right while the forefinger of the right hand pulls the thumb of the left as an imaginary trigger. The Hashi then retires, and another takes her place. Sometimes a different dance is chosen, it is called the Harbi. The Hashi in this takes very short quick steps, the time is much faster and she runs round and round very much in the same manner as a mechanical toy. These songs and dances will sometimes last the whole night through. The Bedouin will sleep merely an hour before they go off into the hills with their flocks at daybreak, once there they sleep through the heat of the day, and come back ready for another night of singing and dancing. The Hashi can never be a married woman.

GRACE WAS UNNECESSARY

Elizabeth's mother did not teach her little daughter much that she should have learned about religion, nor did the father.

The other day a guest said to the little girl, "Elizabeth, does your father say grace at the table?"

"What grace?" returned the girl innocently.

"Why, thanks for what you have to eat."

"Oh," replied Elizabeth, now enlightened. "We don't have to thank any one for what we have—we always pay cash."