Any sums which may accumulate from the interest of the fund, above what is required for the purposes specified, are to be used "in aid of investigation of meteoric bodies, to be made and carried on by a citizen or citizens of the United States of America."

THERE being a notable difference between the determinations of specific weight of the normal hydrate of sulphuric acid, H_2SO_4, which have been made by Marignac in 1853 and 1870, and later on by MM. Schertel, Kohlrausch, Lunge, and Naeff, Prof. Mendeléeff, aided by M. Pavloff, has recently determined it again with all possible accuracy, and communicated the results of his determinations to the Russian Chemical Society (*Journal*, vol. xvi. fasc. 5). The hydrate was crystallised four times, the operations being made in a perfectly dry atmosphere of carbonic acid. Out of 6 kilogrammes, a remainder of only 300 grammes was received. The thus prepared hydrate melted at 10°·1 to 10°·6, and an accurate titration of it gave the following figures: 81·71, 81·52, and 81·58, that is, on the average, 81·6 per cent. of SO_3, the theoretic percentage deduced from the chemical formula being 81·64. The specific weight of the hydrate has been determined with great accuracy, and the average result, with all necessary corrections, was 1·83295 at 19°·02. The reduction to 15°, as compared with water at 4°, being made with Marignac's data for dilatation, the final result will be 1·8371, which figure differs only by 0·0001 from that of Marignac, and widely differs from those of Kohlrausch, Lunge, and Naeff.

WHEN submitting the Baku naphtha to fractional distillation, carried on at each 2°, Prof. Mendeléeff had shown that the specific weight of the products of distillation, while rising on the whole together with temperature, decreases however three times, namely, between 55° and 62°, between 80° and 90°, and between 105° and 110°. He shows now, in a recent communication to the Russian Chemical Society (*Journal*, vol. xvi. fasc. 5), that this is not a peculiar feature of the Baku naphtha, but that the same decrease of specific weights is displayed also by American naphtha, if this last be submitted to fractional distillation at each 2°, and that the phenomenon is produced at nearly the same temperatures. The products that boil below 60° were insufficiently represented in Prof. Mendeléeff's samples; but from 60° (where the specific weight, reduced to 17°, like all following, was 0·6642) until 124° (where it was 0·7322), there are two decreases of specific weight. Thus, at 80° it was 0·7347, but only 0·7069 at 92°, that is, the same as at 75°. After that it increases until 104°, where it reaches 0·7543; but it soon decreases for a second time, and at 115° to 117° it reaches 0·7270, that is, the same figure as it had between 85° and 98°. Beyond 117° it continues to rise. Both kinds of naphtha—Caucasian and American—however different their origin, thus display the same phenomena at nearly the same temperatures; the corresponding specific weights, however, are not the same; the portion at 80° has, in the Baku naphtha, a specific weight of 0·7486, and only 0·7347 in the American; and at 100° the respective densities are 0·7607 and 0·7380. The amounts of substance distilled at each temperature are also different. The researches will be continued in Prof. Mendeléeff's laboratory.

WE have been requested to state that at the meeting of the Essex Field Club, referred to in last week's NATURE (p. 343), the natural history and archæological conductor who addressed the Club on the "salting mounds" and other subjects was Mr. Henry Laver, F.L.S., of Colchester.

THE additions to the Zoological Society's Gardens during the past week include a Bonnet Monkey (*Macacus sinicus* δ) from India, presented by Mr. T. S. T. Tregellas; a Striped Hyæna (*Hyæna striata*) from North Africa, presented by Sir John H. Drummond Hay, K.C.B., C.M.Z.S.; three Greater Sulphur-crested Cockatoos (*Cacatua galerita*), three Leadbeater's Cockatoos (*Cacatua leadbeateri*), a White-backed Piping Crow (*Gymnorhina leuconota*) from Australia, a Red-sided Eclectus (*Eclectus pectoralis*) from New Guinea, a Blue and Yellow Macaw (*Ara ararauna*) from South America, six Amherst Pheasants (*Thaumalea amherstiæ*) from China, eight Himalayan Monauls (*Lophophorus impeyanus*) from the Himalayas, two Javan Peafowls (*Pavo spicifer* δ δ) from Java, presented by Mr. Charles Clifton, F.Z.S.; a Rough-legged Buzzard (*Archibuteo lagopus*), British, presented by Sir R. Payne Gallwey, Bart.; a Cockateel (*Calopsitta novæ-hollandiæ*), a Rose-Hill Parrakeet (*Platycercus eximius*) from Australia, presented by Mr. J. W. Dixon; a Green Turtle (*Chelone viridis*) from the West Indies, presented by Mr. A. E. Painter, F.Z.S.; a Loggerhead Turtle (*Thalassochelys caouana*) from the Atlantic Ocean, presented by the Surrey Commercial Docks Company; a Leopard Tortoise (*Testudo pardalis*) from South Africa, presented by Mr. William Lane; a Slow-worm (*Anguis fragilis*) from Norfolk, presented by Mr. T. E. Gunn; a Bonnet Monkey (*Macacus sinicus*) from India, a Blue-fronted Amazon (*Chrysotis æstiva*) from Brazil, a Grey Parrot (*Psittacus erithacus*) from West Africa, an Alligator Terrapin (*Chelydra serpentina*) from North America, deposited; two Jardine's Parrots (*Pæocephalus gulielmi*) from West Africa, two —— Conures (*Conurus perlatus*) from the Lower Amazons, an Electric Eel (*Gymnotus electricus*) from British Guiana, purchased; a Mule Deer (*Cariacus macrotis*), born in the Gardens.

OUR ASTRONOMICAL COLUMN

THE NEXT MINIMUM OF MIRA CETI.—In the ephemeris of variable stars for 1884 in the *Vierteljahrsschrift*, the next minimum of Mira is fixed to 1884 October 24, a date which does not appear to result from Argelander's formula of sines, as it is given in Schönfeld's Catalogue of 1875, viz. :—

$$\begin{aligned}\text{Epoch Min.} = 1866\ \text{August}\ 8^{\text{d}}\cdot0 &+ 331^{\text{d}}\cdot3363 \cdot E \\ &+ 10^{\text{d}}\cdot48 \sin\left(\frac{360^\circ}{11} \cdot E + 282^\circ\ 45'\right) \\ &+ 18^{\text{d}}\cdot16 \sin\left(\frac{45^\circ}{11} \cdot E + 31\ 15\right) \\ &+ 33^{\text{d}}\cdot90 \sin\left(\frac{45^\circ}{22} \cdot E + 70\ 5\right) \\ &+ 65^{\text{d}}\cdot31 \sin\left(\frac{15^\circ}{11} \cdot E + 179\ 48\right)\end{aligned}$$

For the present year E = 20, and hence substituting logarithms the four perturbations become—

$$\begin{aligned}+ [1\cdot020036] \sin (217^\circ\cdot29) &= - 6^{\text{d}}\cdot35 \\ + [1\cdot25912] \sin (113^\circ\cdot07) &= + 16^{\text{d}}\cdot71 \\ + [1\cdot53020] \sin (110^\circ\cdot99) &= + 31^{\text{d}}\cdot65 \\ + [1\cdot81498] \sin (207^\circ\cdot07) &= - 29^{\text{d}}\cdot72\end{aligned}$$

The Julian date of the initial minimum is 2402822, and we have—

	2402822·0
331·3363 . E	6626·73
Sum of perturbations	12·29
Julian date of next minimum	2409461·0

Which it will be seen from the *Nautical Almanac* (p. 486) corresponds to 1884 October 11. In 1882 by a very precise determination of the time of minimum, Schmidt found that it occurred on December 16, which is 18 days earlier than the date given by Argelander's formula, and the previous maximum had also been earlier by about 19 days. If this correction still applies the next minimum might be expected to fall about September 23, or a month earlier than the *Vierteljahrsschrift* has it. Still there is the possibility that Prof. Schönfeld may have applied corrections to the formula.

The present year's minimum may be therefore advantageously observed. In that phase Mira descends to about the brightness of the well-known star following it, not far from the parallel, or to about 8·5 m.

Another of the more interesting variables, χ Cygni, may be expected at a maximum about November 15, and R Leporis, "the crimson star," at a minimum on January 5.

THE DOUBLE-STAR 99 HERCULIS.—Mr. S. W. Burnham, in his last Catalogue of double-star measures, refers to a statement by M. Flammarion to the effect that the change in the position of the companion of 99 Herculis (one of Alvan Clark's discoveries) very nearly corresponds to the proper motion of the large star. But although the alteration in position between Dawes' measures in 1859 and Mr. Burnham's in 1880, may be fairly represented by rectilinear motion, it will hardly appear, when the best value we can assign at present for the proper motion of 99 Herculis is introduced, that it accounts for the observed change in the position of the companion. If we compare Bradley for 1755 with the Greenwich Catalogue for 1864, employing the accurate formulæ, we find :—

Secular proper motion in right ascension ... $-11''\cdot34$
,, ,, ,, declination ... $+6''\cdot90$

Mädler assigned for the respective proper motions $-10''\cdot4$, and $+7''\cdot0$.

Taking for comparison the following measures of 99 Herculis,

	Position	Distance	
	°	″	
1859·63 ..	347·2 ...	1·705 ...	Dawes
1880·18 ...	29·9 ...	0·91 ...	Burnham

we find on bringing up Dawes' measures to Burnham's epoch, with the proper motions of the principal star given above, the angle of position becomes 81°·5, and the distance $1''\cdot65$, showing a great difference from the result of the American astronomer. It seems at least probable, as he remarks, that it will prove to be a physical pair.

THE WATER SUPPLY CONFERENCE

THE Water Supply Conference of the Society of Arts, held at the National Health Exhibition, in the unavoidable absence of the President, H.R.H. the Prince of Wales, was opened by Sir Frederick Abel, C.B., F.R.S., chairman of the Council, who alluded in his introductory address, to these Congresses having been originated by His Royal Highness, who hoped a comprehensive scheme might be elaborated that would provide not only for the urban populations, but for the rural communities. He alluded to the good and useful work done by the Congress held in 1878, and in 1879, and reviewed the present position of the water-question in this country.

The papers read at the Conference were placed under three heads, viz. :—"*sources of supply*," "*quality of water*, with methods of filtration and softening," and "methods of *distribution*, with modes of giving pressure, house fittings, discovery and prevention of waste." Under all heads valuable papers were contributed, and the Society may again be congratulated on bringing together a jury of experts capable not only of showing us the weak points in our existing water-supply, but the methods by which these defects may be remedied. This was done to a large extent by the previous Conference, but the dangers then pointed out have been hardly appreciated, owing to the years of the Conference being followed by a remarkable succession of wet seasons. Now that a hot summer is succeeding a dry winter, the gravity of the situation is forcing itself upon public attention, and the importance of husbanding our water resources is found to be a matter of vital necessity, the neglecting of which has already facilitated the spread of English cholera, in certain districts, and will be a constant element of danger, should Asiatic cholera appear on this side of the English Channel.

Rainfall being the source of all water supply, it may be well to first notice the paper contributed by Mr. G. T. Symons, F.R.S., who, just a quarter of a century ago, instituted the first general series of rainfall observations ever made in this country, and who since that time has been gradually increasing their number, until there are now nearly 3000 observers, no less than 2433 stations having furnished perfect records of rainfall last year. Worthy of all praise as is this remarkable voluntary staff of observers, not only giving their services, but actually contributing 99 per cent. of the cost of publishing the observations made, it is obvious, looking to the direct bearing such observations have on engineering, agricultural, and sanitary questions, bearing on the health and welfare of our population, that the scope of the inquiry should be enlarged so as to increase its sphere of usefulness, and that it should be placed under a Government department with a grant from Parliament, and the inquiry be no longer crippled for want of funds as regards possible and necessary extensions, though ten years ago the British Association for the Advancement of Science, feeling it their duty to initiate, rather than support, investigations of national importance, withdrew the vote with which they had aided the work for many years, it is due to Mr. Symons to point out that he has not merely maintained the standard of excellence found in his annual volumes of that period, but has increased their size and usefulness. In his paper Mr. Symons urges as a question of general policy the necessity of the formation of an hydraulic office, the early duty of a Government being "to see that all parts are completely supplied with the chief necessary of life. Englishmen," he says, "have a dread of centralisation, but in many ways they pay a long price for their dread. At present, it is not often that any town can even state before Parliament its views as to the effect upon it of what its next neighbour may be obtaining powers to do," and which, when passed by Parliamentary Committees become law, and "law for all time to come;" he truly adds that "no one can foresee what will be the total population of the country a century hence. No one can tell where the bulk of the people will reside, nor what will be the need for water in various parts of the country," and he justly urges that special water rights, "now asked to be created, should be subject to revision, *without compensation*, after the lapse of 100 years."

Mr. E. Bailey-Denton, in his paper on "The Water Supply of Villages and Rural Districts," points out that though a state department exists charged with sanitary matters, the condition of our rural districts as regards water supply "is a positive disgrace," and he considers the department should have their efforts specially directed to the protection of small communities, and states that those who form the "Local Boards" and "Boards of Guardians," having jurisdiction over such districts are elected under pledges to oppose all sanitary works that will increase the rates, and that even when men of knowledge and position are elected to such posts—outvoted by the majority they fall back to quietly agreeing with the *laissez faire* policy of their colleagues, and allow their constituents to continue to inhale and imbibe those germs of disease which float in the foul air that surrounds them, and are present in the only water provided for their use. Mr. Denton is evidently of the opinion that the writer has already advocated in these columns, that the Local Government Board should not only have the power to sanction local authorities providing pure water and efficient sanitary arrangements, but should themselves survey the country and seek out the districts where advantage is not taken of the law, as it even now exists, and to compel the authorities to remedy the abuses and shortcomings discovered.

In the present position of our knowledge it would be difficult, and often impossible, for an engineer to advise such a rural authority, suddenly called on to provide itself with an efficient water supply, even were the legal difficulties, and cost of parliamentary struggles obliterated. Thanks to Mr. Symons, we know something of the rainfall, but as Mr. Conder and others have pointed out, our knowledge of the discharge of our rivers is lamentably small. Daily gaugings have been taken of the Thames, but no systematic examination of the quantities run off by streams draining equal areas of rocks of varying degrees of permeability have been carried out, and the necessity of such observations being taken in all our streams cannot be too highly insisted on, and should be made a matter of State care. The few observations we have were chiefly made in the last century by Rennie, if we except the comparison of chalk and clay basins, made by Mr. C. Homersham, who showed the large quantity of water absorbed by the chalk, which never appears as streams. As regards underground waters, our knowledge is also not yet sufficiently definite to safely predicate the quantity of water a given unknown district will yield. A large body of information has been published by the Underground Water Committee of the British Association, during the past ten years, from which the direct relation of yield to rainfall, modified by degree of permeability is clearly made out, and details given of actual supplies obtained in enormous quantities, in certain districts, but what is still required, is a systematic examination of the height of water in wells and borings throughout the kingdom, and until the seasonal variation is clearly established, the minimum yield to be obtained in a given district, during a dry year, and still more after a succession of dry years cannot be ascertained, or calculations made be depended on with any safety. Information of this class is being steadily