36-inch Lick, using a power of	...	...	1800
28-inch Greenwich	,,	,,	...	...	1400
18½-inch Dearborn	,,	,,	...	...	950
8-inch (Maw)	,,	,,	...	...	400
6-inch (Solà)	,,	,,	...	...	300

Atmospheric conditions affect the large glasses much more than the smaller, for we find in actual practice that the Lick observers prefer powers of 1000 and 1500; the Greenwich observers prefer 670 and 1120; Hough, with the 18½-inch, used generally a power 390, and less frequently 925.

Maw uses powers of about 300 and 400 on both his 6-inch and 8-inch, while Solà uses 350 on his 6-inch.

When an observer is quite used to his instrument and his eye-pieces, he develops a preference for one particular eye-piece under most all conditions.

One element, as yet not mentioned, has naturally a great influence in the choice of an object-glass, viz. the range of visibility, or the ability to show faint objects. The above remarks apply to pairs the components of which are fairly equal; but, in general, distant companions are very faint.

The light-grasping power of a telescope depends on the surface or diameter squared of the object-glass. A good 1-inch object-glass should show a ninth-magnitude star, and one star is said to be a magnitude fainter than another when its light is 2·5 times less.

Consequently, the aperture must be $\sqrt{2\cdot5}$ greater to show it. Roughly, $\sqrt{2\cdot5}=1\cdot6$, and hence if 1 inch shows a ninth magnitude $1\times1\cdot6$, or a 1·6-inch shows a tenth magnitude, or generally

Star magnitude	9	10	11	12	13	14
Aperture in inches	1·0	1·6	2·5	4·0	6·3	10·0

Of course, this table is not to be taken too seriously, as it is governed by much the same conditions as already mentioned for separating power. Bear in mind Burnham's words: "An object-glass of 6 inches one night will show the companion to Sirius perfectly; on the next night, just as good in every respect, so far as one can tell with the unaided eye, the largest telescope in the world will show no more trace of the small star than if it had been blotted out of existence."

I hope, with a little twisting and adaptation, the foregoing remarks may be made to answer the fundamental principles underlying the apparently easy questions.

Mr. Scholes is quite right as to the glare, and the larger aperture by increasing the separation, and by making the apparent discs smaller, does make observation easier.

T. LEWIS.

Colour-vision.

As one who was responsible for the testing for colour-vision of several thousands of drivers and firemen, I should like to refer to the method of testing by means of different coloured skeins of wool.

The usual method is to take a particular skein of wool and request the person who is being tested to select in succession the three or more skeins which mostly resemble it. In some cases I found that men who were clearly colour-blind succeeded in passing such a test satisfactorily.

It must be remembered that a colour-blind person has been accustomed to consider his capacity for appreciating colour differences in the light of other people's statements. It thus comes about that they learn to consider differences, which are really colour differences to those whose sight is normal, as being partly due to intensity of light, texture, or other considerations. They are aware, of course, that they cannot always detect differences of colour in the ready way that others can, but they also feel that they can often see differences much more quickly than can others. With the colour-blind, therefore, the capacity for matching or naming colours becomes more and more perfect the greater their experience becomes of the objects to be compared. Now, in the case of the wool test, the different coloured skeins are certainly in many cases of different texture, coarseness, or gloss. The skeins are also frequently numbered. With a little careful study of the wools with which the tests are carried out, it may be quite possible for a colour-blind man to get through the tests satisfactorily unless great care is exercised.

I found the following to be a ready method of detecting colour-blindness. The wool skeins were arranged in the order of their brightness, the white skein being at one end and the black at the other. It is, of course, somewhat difficult to estimate the comparative brightness of a red and a yellow object. I found, however, that with a little practice and care this could be done satisfactorily. If a person whose vision is normal be asked to pick out the darkest skeins, he will at once pick the black one and afterwards those next to it. On the other hand, a colour-blind person will probably pick the black skein first and then the reds or greens, the darker shades being selected first. A test of this kind is most striking. In one case, a man who had got through the ordinary tests with some hesitation selected all the reds before the dark greys, neutral tints, greens, &c., although some of the reds were much brighter colours than the greens.

The better plan is to take a number of different coloured skeins of wool and ask the person who is being tested to arrange them in their order of brightness. A markedly colour-blind person cannot do this properly.

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LAKE EDWARD, RUWENZORI, AND THE UGANDA-CONGO FRONTIER.

THE argument lately arrived at by the representatives of Great Britain and the Congo has affected the settlement of a troublesome boundary dispute, in which the competence of any diplomacy to deal with a geographical question in a scientific manner has not shown itself in a particularly favourable light.

The original agreement, the *fons et origo* of all the subsequent mischief, was signed at Brussels on May 9, 1894. By this it was enacted:—

"That the sphere of influence of the Independent Congo State shall be limited to the north of the German sphere in East Africa by a frontier following the thirtieth meridian east of Greenwich up to its intersection by the watershed between the Nile and the Congo, and thence following this watershed in a northerly and north-westerly direction."

At the time this agreement was made the 30th meridian was shown on the maps as dividing Lake Edward into two approximately equal parts, and as passing to the west of the whole Ruwenzori range. It is, however, a commonplace among geographers and surveyors that a determination of longitude in an unsurveyed country is liable to large errors, and that a meridian line is, of all possible boundaries, the worst that can be selected. In this case the actual event proved that the selection of this line had resulted in the maximum of inconvenience and loss. The true position of the meridian was found to be about half a degree east of its position as assumed in 1894, and a strict interpretation of the letter of the treaty would have involved our retirement from Lake Edward and from practically the whole of the Ruwenzori district. Such a contingency was obviously intolerable, and the only practicable course was to arrive at some sort of compromise which should, as far as possible, minimise our loss. The commissioners entrusted with the recent negotiations arrived at what perhaps was the best solution available at this date, and by surrendering to the Congo the whole of the north shore of Lake Albert, they regained the eastern half of Lake Edward, and about half Ruwenzori. The net result of the whole transaction is therefore that we lose all the country lying between Lake Albert and the Congo-Nile watershed and the western half of the Ruwenzori range.

From the geographical point of view the great error

that was committed was the definition of a frontier by a meridian line, and what makes the error the more regrettable is that this unscientific boundary was a gratuitous importation, which was substituted for the perfectly precise and scientific frontier laid down in the original act constituting the Congo State. This frontier was the watershed line dividing the Congo basin from the surrounding river basins, of all natural geographical frontiers the most satisfactory.

It was defined, with ideal precision, in the "Berlin Act" of February 26, 1885, in the following words :–

"All the regions forming the basin of the Congo and its outlets. This basin is bounded by the watersheds (or mountain ridges) of the adjacent basins, namely, in particular, those of the Niari, the Ogowé, the Schari and the Nile on the north. . . . It therefore comprises all the regions watered by the Congo and its affluents."

Apart therefore from the actual method of frontier definition, we cannot avoid the conclusion that to have allowed the Congo State to acquire claims to any territory outside the actual Congo basin was a surrender of our clear rights. We may remind those of our readers who have not got a map in front of them that both the Lakes Albert and Edward and the Semliki river, which connects the two, lie wholly within the Nile basin.

Our knowledge of the interior of Africa has so progressed since 1894 that there is no locality where a mistake, at all comparable in magnitude, could be made at the present time. We may further be permitted to hope that the spirit in which our great departments of State approach this and similar questions has undergone such a change in the last few years that a total setting aside of all expert opinion, on which alone the agreement of 1894 is explicable, is no longer probable. E. H. H.

WILLIAM JAMES.

THE announcement of the death, at the comparatively early age of sixty-eight, of William James, emeritus professor of philosophy in Harvard University, will have been received with regret by an unusually wide circle of readers of philosophic literature, and with deep sorrow by an unusually large circle of friends, who knew from experience how much greater was the charm of his personality than the charm even of his writings. But few even of his friends can have suspected under what physical disabilities were produced the utterances of which the sunny geniality, irrepressible vitality, coruscating vividness, and brave optimism, unstained by any shadow of insincerity or cowardice in facing the ills of life, so deeply fascinated them, or realised that they were listening to a martyr to a grave cardiac affection, whose life for the last ten years had hung by a thread.

This is not the place for an estimate of James's achievements as a philosopher, but it will not be amiss to signalise the intimacy of his relations to science. It is not often that a philosopher of the first rank has had the good fortune to receive a scientific education or the literary genius to gain by losing a literary education. But William James is a shining example of how stimulus and freshness may be imparted even to philosophic subjects by one who is allowed to approach the real problems direct, and without wandering through a thick fog of historic errors. Originally trained for the medical profession, he became interested in "pure" science; accompanied Agassiz on an expedition to Brazil; was appointed to teach anatomy at Harvard; proceeded to the teaching of physiology; approached psychology from the physiological side; became a peerless master in the art of psychological description; applied his psychology with revolutionising and revivifying effect to the study of religion, superstition, logic, and to that chamber of horrors for unsolved puzzles which is called metaphysics; and, finally, before he could formulate his conclusions, was taken from the world he had studied so variously and with such eager human sympathy. But at heart perhaps his attitude towards life always remained psychological. He was more interested in discovering and describing facts than in dogmatising and system-building with them, and almost as disregardful of formality as of technicality and pedantry.

To scientific psychology his services are admittedly immense. His work on "The Principles of Psychology" (1890) at once became a classic, and is likely to remain so. He found the science entangled in metaphysical obscurities and based on false descriptions. He insisted that it should be made a natural science, descriptive, and, wherever possible, experimental, and described its facts anew. His fundamental innovation was to perceive that the "facts" of consciousness form a continuous flow and *not* a succession or series of separate facts, as, since Hume, psychologists and their metaphysical opponents had alike assumed. The consequence was that the problem of *synthesis* disappeared, and that the function of scientific knowing became the *analysis* of a continuum. When the meaning of this has been fully grasped, it will be seen that a number of metaphysical puzzles (*e.g.* about "the one" and "the many") answer themselves.

But James also saw that if psychology was to progress further on the road to an exact science, it must not be only descriptive, but must devise applications of its theories sufficiently precise to discriminate between alternative interpretations by their differential values. This probably was one of the main motives that led him to make the great generalisation of scientific method which is known as pragmatism, though he also conceived it in another aspect as an extension to psychology and logic of the biological conception of survival and the Darwinian principle of selection. Of pragmatism he was practically the founder, though he took a hint and the name (which is a bad one) from his friend C. S. Peirce, and it was to the explanation and advocacy of this method that the last dozen years of his life were devoted. The controversy which was thereby started is still unfinished, and, indeed, is only just beginning to bear fruit.

But it is a psychological curiosity how few of the many who denounced James as a dangerous revolutionary perceived that the doctrine that the meaning of an assertion depends on the value of its consequences enunciated merely the scientific postulate that all assertions must be *tested*, and that any doctrine which could not be applied to any problem was unmeaning. One can only suppose that this philosophic generalisation of scientific practice was propounded to persons who, as a matter of psychological fact, were not in the habit of subjecting their pet convictions to any test, and therefore aroused so great an emotional disturbance that the actual doctrine was hardly attended to. A similar reception was accorded to James's account of the will and the right to believe. James, after pointing out that, as a matter of psychological fact, there existed a strong bias in men to believe what they desired, had restricted the right to believe to cases where a choice between a number of intellectually possible alternatives was practically necessitated, and asserted that in such cases the empirical consequences of the belief, favourable or otherwise, formed the test of its truth. Whereupon he was, in spite of repeated disclaimers, universally credited by his critics with exhorting men to believe whatever they pleased without regard to the consequences!