50 c.c. Burettes (with tap). N.P.L. limits:—Maximum error allowed at any point, and also maximum difference allowed between the errors at any two points:—Class A, ± 0.04 c.c. Class B, ± 0.07 c.c. The delivery times specified depend on the length occupied by the graduations. For lengths between 50 cm. and 55 cm. the times are:—Class A, 110–220 sec.; Class B, 75–220 sec.

November purchase, mainly British.							March purchase, German.						
Capacity errors, c.c.					Difference between smallest and largest error, c.c.	Delivery time, secs.	Capacity errors, c.c.					Difference between largest and smallest errors, c.c.	Delivery time, secs.
10 c.c.	20 c.c.	30 c.c.	40 c.c.	50 c.c.			10 c.c.	20 c.c.	30 c.c.	40 c.c.	50 c.c.		
* -0.01	0.00	-0.02	0.00	0.00	0.02	51	-0.01	-0.07	-0.12	-0.13	-0.12	0.12	14
* -0.05	-0.05	-0.09	-0.10	-0.05	0.05	69	-0.05	-0.09	-0.07	-0.13	-0.20	0.15	78
+0.07	+0.09	+0.08	+0.14	+0.10	0.07	52							
-0.04	-0.01	-0.03	-0.11	-0.13	0.12	24	-0.02	-0.06	-0.10	-0.14	-0.18	0.16	24
-0.04	-0.12	-0.14	-0.14	-0.17	0.13	39	-0.02	-0.10	-0.10	-0.11	-0.20	0.18	43
-0.08	-0.10	-0.14	-0.25	-0.27	0.19	21							
+0.13	-0.09	-0.16	-0.14	-0.10	0.29	58							

The results marked *, i.e. those which relate to apparatus bearing well-known British trade-marks, are very satisfactory. Of the twenty pieces of apparatus thus marked only five have capacity errors in excess of the Class B limits, and of these four have errors but slightly in excess of the Class B limits, the only really unsatisfactory piece of apparatus being the 10 c.c. pipette in error by +0.065 c.c.

The results for the German apparatus clearly show that such apparatus cannot be accepted on trust, as many users appear to imagine. For example, the 50 c.c. German pipettes include a number which have excessive errors and delivery times so short as to render them likely to give inconsistent results. The ordinary grade German apparatus has no claim to superior accuracy as compared with ordinary grade British apparatus.

The results obtained indicate that where accuracy is of importance apparatus should be tested before use, and that in cases where untested apparatus is to be used the safest procedure is to obtain apparatus bearing the trade-mark of British firms which make a feature of supplying apparatus marked by the National Physical Laboratory. Their experience in the manufacture of such apparatus is clearly reflected in the increased accuracy of their ordinary output as compared with apparatus not bearing their trade-marks.

J. E. PETAVEL,
Director.

The National Physical Laboratory, April 16.

Young's Interference Experiment.

IN connection with Dr. Houstoun's letter on this subject in NATURE of April 28, I may direct attention to a note by my father "On a Simple Interference Arrangement" (British Association Report, pp. 703-4, 1893; Collected Works, vol. iv., p. 76). The arrangement described is a tube with a single slit at one end and a double slit at the other. The double slit is ruled on silvered glass, and is much closer than Dr. Houstoun describes—about 1/10 mm., as nearly as I can estimate without pulling the apparatus to pieces. The slit at the other end is about 0.35 mm., and the length of the tube about 31 cm. The apparatus as originally described was intended to be used with the double slit placed close to the eye and the tube directed to a source of light such as a gas flame or the sky. Interference bands are then well seen.

About two years before my father's death I remember asking him whether he had ever seen Young's

experiment tried. He replied in the negative, and suggested trying it. It was during a vacation, and I had leisure to do so. In looking round for the necessary appliances it occurred to me that the "simple interference arrangement" was just what was wanted. I placed it in a hole in the shutter of a dark room, with a heliostat outside, so that the single slit was backed by the reflected image of the sun. No lenses were used. The interference bands were then admirably seen on a card held, so far as I remember, 2 ft. or 3 ft. away from the double slit. My father remarked that he did not remember to have seen interference bands projected so well before with any arrangement.

It will be noticed that this use of the apparatus is not materially different in principle from the original subjective use. To pass from the one arrangement to the other we have only to substitute the card screen for the retina and to increase the focal length of the lens of the eye without limit, at the same time removing the screen to a great distance.

RAYLEIGH.

Terling Place, Witham, Essex, April 29.

An Addition to the British Fauna (*Rhynchodemus Scharffi*).

ONE of my students, Mr. G. D. Morison, has brought me a very interesting Planarian worm which he found this morning under rotten wood in a coal-shed in a garden at Chiswick. This is the fourth specimen which he has found in the same place, where they were associated with slugs, upon which they may have been feeding. The other three specimens were found a week ago. A living specimen was measured up to 6 cm. in length when crawling. In this condition the worm is very slender; when contracted it is naturally a good deal thicker and exhibits a transverse wrinkling. The colour in life is usually bright yellow, without pattern, but with a dusky anterior tip bearing the two small eyes close to the extremity. Mr. Morison tells me, however, that one specimen was salmon-pink.

The specimen submitted to me (alive) agrees very closely with von Graff's description and figures of his *Rhynchodemus Scharffi*, and I have no hesitation in identifying it with that species, which was first discovered in 1894 in a Dublin garden, and has not, so far as I am aware, been recorded since. Von Graff at first supposed that the species had been introduced from the tropics, but afterwards adopted Dr. Scharff's view that it is indigenous to Ireland. It is hard to

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say which of the two views is supported by the discovery of the same species in London. Mr. Morison assures me that no plants have been introduced into his garden for at least three years. Probably the worm will be found in other parts of London, and it would be worth while to search carefully for it at Kew.

It will be remembered that another land Planarian, *Placocephalus (Bipalium) kewense*, was first found at Kew and is admittedly exotic, having since been found in many parts of the world, especially in the neighbourhood of botanic gardens, being distributed, doubtless, with plants. There is, however, one undoubtedly indigenous British land Planarian, *Rhynchodemus terrestris*, which differs from *R. Scharffi* in its grey colour and much smaller size. This worm is rarely met with unless carefully searched for, and it is quite possible that *R. Scharffi* also will yet be found in situations less open to suspicion than Dublin and London gardens. I hope that the publication of this letter may lead to such a discovery.

ARTHUR DENDY.

Zoological Department, University of London
(King's College), April 28.

Method of Cutting Sections of Cotton Hairs.

No satisfactory method of cutting sections of cotton hairs and similar material appears to have been published; the technique recommended by Balls ("Development and Properties of Raw Cotton," p. 176) is open to the objection that the hairs pull away from the wax at the cutting surface, thus losing the rigidity which is essential for good sections, and attempts made to remedy this by coating the hairs with a paraffin-wax different from that of the main embedding mass did not produce any marked increase in adhesion; while embedding in celloidin or cellulose acetate gave very unsatisfactory results by reason of the contraction and distortion of the hairs.

The method finally evolved was modified from that of Breckner (*Z. f. Wiss. Mikr.*, vol. xxv., p. 29, 1909), and is dependent on the use of a coating of celloidin to procure greater adhesion to the wax embedding mass. The cotton, fixed in a small wire frame for greater convenience, is "wetted out" with absolute alcohol and placed in a dilute syrupy solution of celloidin in alcohol-ether, which is allowed to evaporate to half or a third of its volume. The material is then taken out, squeezed between the fingers to remove excess of fluid, and placed in a chloroform solution of paraffin-wax for two hours, after which the cotton is cut from the frame, transferred to paraffin, and quickly embedded. Sections should be cut without delay, as the material appreciably toughens within twenty-four hours, but blocks can be stored in water for an indefinite time if a trace of antiseptic be added.

Cutting should preferably be done on a sliding microtome, but 5μ sections have been made without difficulty on a Leitz "Minot," with the knife oblique. A useful way of dealing with the sections when cut is to dissolve away the wax and celloidin in alcohol-ether and centrifuge. If the sections are thin enough a very large proportion will be the right way up when spread upon the slide.

Since this letter was written a description of a method for embedding cotton yarns and fabrics has been published in the *Journal of the Textile Institute* (April, 1921) by Willows and Alexander. Opportunity has not so far arisen for comparative tests of the two techniques.

H. J. DENHAM.

Botanical Laboratory, British Cotton-Industry
Research Association, Shirley Institute,
Didsbury, April 20.

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An Unknown Organism in Flint.

A PIT dug in my garden here exposed about 12 ft. of the usual Thames Valley gravels and sands, at which depth (approximately) what local excavators call "shingle" was reached. This is composed chiefly of flint-stones mixed with sand, and lacks the binding properties of the gravel above. The rule is to stop digging for gravel when the "shingle" appears.

Pending a detailed description which will be given elsewhere, I may say that the gravels consist of various types of flint and different kinds of sand-stones, together with quartzites, vein quartz, Lydian stone, chert with spicules, fragments of sarsen, etc., some of these being of sufficient interest to warrant the cutting of micro-sections. During the last few years some hundreds of these stones have been washed and examined by the platyscopic lens and microscope for surface features.

On one of the flint fragments I discovered a minute fossil organism resembling some form of insect, the like of which, so far as I can ascertain, has not been seen in flint before. There is a head with curious projections on either side, club-shaped antennæ which

FIG. 1.—Photomicrograph of an apparent organism in flint. Magnification, about 30 diameters.

are segmented, a thorax, and an abdomen, but no legs are visible.

The chitinous parts appear to be silicified, and show up well when moistened under a low power, but there are reasons why it is a very difficult object to photograph satisfactorily in the ordinary way. The one I enclose was kindly taken for me by Mr. A. Cornell with a super-microscope, the magnification being about 30 diameters (Fig. 1).

It is difficult to understand how an organism of such delicate structure could have been preserved in flint unless its entombment occurred while the flint was in a colloid condition. If any reader of *NATURE* can say what the organism is, I shall feel grateful.

C. CARUS-WILSON.

Strawberry Hill, Middlesex

Ocean Tides.

WHILE not considering myself qualified to question the gain to scientific knowledge on the theoretical side which might accrue from the investigation of ocean tides, such as Prof. Proudman suggested in his article in *NATURE* of April 7, p. 176, I yet venture the opinion