At the rear of the building and just outside the machine shop is an unloading bay, served by a two-ton travelling crane, which can deliver heavy goods either into the machine shop or through trapdoors into a wide service corridor which runs through the basement to the industrial laboratory.

Perhaps the most striking feature is the industrial laboratory, which occupies practically the entire basement of the new section. This laboratory is 60 ft. long, 40 ft. wide, and 25 ft. high. It is equipped with a two-ton travelling crane, and is spanned by two portable platforms, respectively at 11 ft. and 17 ft. above the floor-level. The concrete floor is provided with special slots to facilitate the fixing of plant; there are also ample drainage facilities. Staging is provided at one end of the laboratory for liquor stock tanks and feed tanks.

Five thousand gallons of softened water can be stored beneath the basement floor, whence it can be pumped to large service tanks on the roof. From there, it can flow by gravity to two 3-inch ring mains surrounding the industrial laboratory, or to the fluid flow laboratory on the second floor. This water can be used as boiler feed or for cooling or condensing purposes. Other ring mains are provided in the industrial laboratory for mains water, gas, steam and compressed air.

Steam for process working is obtained from a vertical boiler, arranged for oil or coke firing, and capable of evaporating 600 lb. of water per hour at pressures up to 200 lb. per sq. in. Two smaller boilers are provided at different points in the building.

The machine shop measures 45 ft. × 18 ft. × 25 ft. high, and is situated in the basement of the old building. It is fitted with a one-ton travelling crane, and contains the machine tools necessary for turning, milling, slotting, shaping, drilling and sawing. Running along one side of the shop is a gallery equipped with precision lathes and sensitive drilling machines for fine instrument making. There is also equipment for welding and small forging.

The erection and equipment of the new laboratory have been made possible by the far-sighted generosity of a number of leading firms and individuals in the chemical and allied industries, who subscribed a capital sum of more than £26,000 and guaranteed an annual income of £4000 for a number of years. Valuable equipment has been provided by many manufacturers of chemical plant.

The laboratory will accommodate fifty students and research workers. This session, the total number of students in the laboratory is thirty. In its organisation and general atmosphere, the laboratory seeks to resemble the development department of a modern chemical works. Every effort is made, also, to maintain and develop the closest connexion with industry. Each member of the staff has had extensive industrial experience both in Great Britain and abroad. Many of the present students, also, have held important positions in industry.

Psychology and Organised Religion.

THE *Journal of Social Psychology* (vol. 2, No. 4) has an article by Prof. Raymond Pearl discussing some points of psychological interest arising out of the American Census of Religious Bodies, 1926. His aim is to see if any evidence, other than that of general opinion, exists to support the view that there has been for some time past a gradual decay of religious influence in European civilisation. He quotes from an eminent man of science, a Wesleyan minister, a Church of England vicar, and a young American clergyman, all of whom maintain that there is increased indifference to organised religion.

If this is so, then here is a problem of social psychology that ought to be studied. Prof. Pearl makes a beginning by analysing such official returns as are available, namely, those provided by the census of religious bodies in the United States. This is a census of religious organisations and is taken every ten years.

During the period 1916–26 the tables show that while church membership has increased at a rate slightly more than the rate of the growth of the population as a whole, yet the increase is very small. It has always been recognised that religious organisations have played an important part in the social life of their members, being at some periods almost the only means of organised social diversion. Hence it seems pertinent to compare the growth of religious organisations with the growth of other forms of social activity. National banks have increased at rather more than three times the rate of the churches, the consumption of alcoholic liquor increased by 4·5 per cent in one year, the manufacture of playing cards by 80·3 per cent, and cigarettes by 97·4 per cent, and still greater was the development of motion-pictures, automobiles, and radio apparatus. It looks as if several non-religious forms of diversion grew in magnitude and presumably in influence during the decade considered.

Again, organised religion has always realised the importance of training the young, and for this end has evolved the Sunday School. Analysis of the records shows that in the older and more highly developed sections of the country the number of scholars has either decreased or increased by an insignificant percentage, whereas in the newer and less developed sections of the country there have been substantial increases. Comparing the membership of the different denominations, a tendency is shown for those characterised by a narrow and rigid body of doctrine, and therefore appealing to the less intelligent groups of the population, to grow more rapidly than those the more liberal doctrines of which appeal to the more intelligent.

The paper is important, not so much for the generalisations, which are admittedly tentative, as for the method employed and for the interest of the point of view.

In *Human Biology* (September 1931), John R. Miner discusses the relationship between church membership and commitments of prisoners. From data available from the Netherlands and the United States, he concludes that there is little evidence that the churches play any large part in the prevention of crime.

Orbit and Mass of Pluto.

LICK Bulletin 437 contains an exhaustive study by Dr. E. C. Bower, of Pluto, the new planet discovered in 1930. All the prediscovery images have been utilised, except those obtained on Flagstaff plates in 1915. Reference is also made to a possible image on a Franklin-Adams plate taken in 1903. Mr. P. J. Melotte, who detected this image, now considers that it is too ill-defined and doubtful to use, in the absence of any confirming images in neighbouring years. The perturbations have been treated in the manner adopted by Dr. P. H. Cowell for Halley's comet. The centre of gravity of the sun and the four

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great planets is taken as origin, and the motion calculated by mechanical quadratures. The final residuals of Pluto are all less than 4″, which is not unduly large, as in many cases the images were ill-defined and far from the centre of the plate. The period is 248·43015 years, and the eccentricity 0·2486438 (it is an aid to memory that the first three digits in these two elements are the same); the perihelion passage is on Sept. 30, 1989. There will not be a conjunction with Neptune at minimum distance (3 units) for about eight thousand years.

The determination of Pluto's mass from Neptune depends largely on the two observations made by Lalande in 1795. As he observed the Right Ascensions to the nearest half-second of time only, they are not exact enough to give a precise result; it is shown that a mass of Pluto, 1·3 times the earth's, gives a zero residual in 1795, while a zero mass makes the 1795 residual 9″. It will, however, be possible to derive a fair value of Pluto's mass from its recent approach to Neptune, when the latter has been observed for some eighty more years, as its orbit will then be known independently of Lalande's positions. Dr. Bower suggests that the approach to Uranus in 1968 (distance 13 units) should also be utilised; for this purpose a long series of accurate positions of Uranus, especially from 1940 to 2000, should be obtained. He suggests photography, with the magnitude of Uranus reduced to that of the comparison stars.

The only estimates of Pluto's mass that can be made at present are based on its stellar magnitude and apparent diameter; these both suggest a mass smaller than that of the earth. However, the unexpectedly high value for the mass of Triton, recently found at Mt. Wilson, suggests a similar possibility for Pluto. M. Baldet, as the result of visual observations with the Meudon equatorial, concludes that the diameter does not exceed 0·2″ (Report of the Paris Observatory for 1930).

Dr. Bower's article contains an accurate ephemeris of Pluto from August 1931 to June 1932; this is for the equinox of 1900; Dr. Bower notes that this is the most convenient equinox if one uses positions of the comparison stars derived from the astrographic catalogues; these contain fainter stars than those given in other catalogues. The images of brighter stars on the Pluto plates are too large for accurate measurement.

A New System of Film Projection.

WELL-ATTENDED demonstrations were given at the premises of Messrs. Robinson, King and Co., Ltd., in Stratford, London, of an invention by Dr. R. T. A. Innes, formerly Union Astronomer, Johannesburg, for increasing plasticity and saving space in projection of films. In place of the usual screen a large plane mirror is to be installed, the picture being projected on an ordinary screen so situated that the audience sees it in the mirror. It may be behind them, or on the ceiling. In the demonstration it was behind, the projector being behind and above the mirror.

Regarding the increase in plasticity claimed, we must confess that we failed to perceive it as regards black and white films. It is also claimed that the effects of grain and scratches are masked, but the films shown were not worn; a slight diminution in the sparkle due to grain was perhaps noticeable. An excellent coloured film shown was, however, certainly improved. Colour adds plasticity to films, and Dr. Innes's plan really ‘varnishes’ the picture, as it were, and thus adds somewhat to the brilliance and depth of the colour. The effect is similar to the difference between matt and glazed photographs, and would finally, as in this case, be a matter of taste. The lure of devices of this kind for inventors is due to the psychological fact that any change in the tint or texture of a photograph, if it is novel, is at first pleasing, since the photograph is inherently inadequate as a representation of three-dimensional reality. The change is usually imagined to make the picture more real—to fulfil our unconscious wish: this will be remembered when the tinting of films was first introduced, and it accounts for the plastic effect of colour. The unsophisticated are immensely pleased by an extremely brilliant glaze on photographs. But these joys are fleeting: custom soon stales them.

The other advantages claimed are more substantial. Installed in a small room or hall, practically the whole floor space may be filled with seats from which a good view is obtained, since even those close to the mirror see the screen as at a convenient distance. Those at the back have a more distant view than they otherwise would, but can still see well. Thus the available space is much increased. The field for the invention is thus chiefly in small, cramped halls, and in education and advertising.

Difficulties arise from the fact that mirrors exceeding a certain size are expensive to make and handle. Even a small screen would need to be built up of two or three parts, and means would have to be found to make the join unobjectionable. Also, the film is seen reversed if projected upon the screen in the usual way, while serious loss of light occurs with through projection, apart from the fact that the gain in space would no longer be present. With on-projection, therefore, the film has to be turned round in the projector, and few projectors allow of this being done with sound-films, since it brings the sound track on the wrong side. However, one portable equipment at least is available in which this difficulty does not occur, and with such an apparatus and Dr. Innes's mirror a small room could be packed with spectators who would all get a satisfactory view.

University and Educational Intelligence.

CAMBRIDGE.—Dr. F. C. Phillips, of Corpus Christi College, has been appointed University lecturer in petrology.

In a report to the University on forestry in the University curriculum, the General Board states that there is practically no future for graduates trained in forestry except in Government forest services. Only twenty to twenty-five of these posts are available each year, and there are no fewer than five university schools, including that at Cambridge, training candidates for these posts. As a result of investigations, the Committee of the General Board concludes that the University is not justified in maintaining a forestry organisation as a recruiting ground for Government services, partly because the demand is so small, but even more because the Committee considers that University policy in forestry teaching cannot be reconciled with the present official view. It is accordingly recommended that the Department of Forestry be suppressed, examinations in forestry for the ordinary B.A. degree be discontinued after 1934, and examinations for the diploma in forestry cease in October 1935.

SHEFFIELD.—The Council of the University has made the following appointments: Mr. B. H. Bentley, lecturer in botany, to be professor of botany; Dr. R. N. Rudmose Brown, lecturer in geography, to be professor of geography; Mr. L. E. S. Eastham, to be professor of zoology; Dr. J. Florey, to be professor of pathology; and Dr. J. W. Edington, to be professor of bacteriology.

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