The activities of the Department comprise, besides administration and scientific research, supply of biological specimens to universities and educational institutions in India, anti-malaria work by the introduction of larvicidal fishes, socio-economic work such as education of fishing people, establishment of co-operative societies for their benefit, etc., propaganda in the form of rural pisciculture, exhibitions, etc., and fishery legislation. Under the heading of "Publications" attention may be directed to *Bulletin on Marketable Fishes* and *A Popular Account of Fishery Activities* which, when published, will greatly enhance the prestige of the Department and will enable the lay public to evaluate for itself the advantages it can receive from the proper working of a scientific fisheries department.

The Expenditure and Revenue of the Department shows an adverse balance of Rs. 1,27,086–4–1, but when the vast advantages the Department confers on the fishing people and the production of a healthy, nutritious diet for the general public are taken into consideration, the subsidy of a lakh and a quarter of rupees from the Provincial revenues seems insignificant. But it seems that in spite of considerable efforts on the part of the Department the real significance of the fisheries is still not fully realised. In the opening paragraph of the introduction the Director says that "indications are not wanting that Fisheries as a latent source of food and wealth has not so far received adequate recognition. Within the last fifteen years the question of the continuance of the Department as a national service has been pressed on Government's attention on no fewer than six occasions. The findings of the census of 1931 that agriculture has reached its maximum production under present conditions and the Presidency can no longer feed itself, is a serious warning to the country that attention should now at least be directed to fisheries as the only other prime source of food-supply, and as a valuable addition to the country's wealth." It may here be recalled what Surgeon-Major Francis Day observed in his *Report on the Fresh Water Fish and Fisheries of India and Burma* (p. ccxxxvii). He stated "how great must be the moral responsibility of legislators, who, living amongst a population such as exists throughout India, more than half of whom would consume fish could they procure it, have permitted the depopulation of the fresh-water fisheries, and allowed the destruction of so great a source for the supply of animal food. Now that it clearly appears millions would eat fish could they obtain it, surely the re-population and future protection of these fisheries will be considered an important subject for consideration as a means of supplying loss of physical powers and nervous energy." The value of this unlimited food-supply of high quality becomes inestimable during famines when crops fail owing to floods or drought. Attention may here be directed to the fact that the Royal Commission on Agriculture made strong recommendations for the economic exploitation of the fisheries in India principally with the idea of improving the physique of the agriculturists whose ill-balanced diet received the attention of the Commission.

Dependence of the "Visibility" of an Object on its Apparent Size.

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IN choosing suitable objects at different distances as landmarks for making observations on "visibility" in meteorological practice, one of the conditions that is considered desirable is that the objects should subtend at the eye of the observer about the same angle. It is also generally known that other conditions remaining the same, an object of smaller angular size ceases to be visible at a shorter distance. In order to obtain some definite information regarding the manner in which our estimate of visibility would be affected if the size of the object is allowed to vary, some experiments were carried out during the last few months in the grounds of the Fergusson College, Poona. The objects under observation were square sheets of white paper pasted on a large blackboard. This ensured uniformity of background and similarity of illumination. The size of the board was about $5' \times 4'$. Five different sizes of paper were used, the sides of the squares being 2·75 cm., 5·5 cm., 11 cm., 22 cm. and 33 cm. Observations were made at different distances from the board nearly normally with the help of a Wigand Step-Visibility-Meter (' Stufen-sicht-messer '). The distance of the place of observation from the object varied from 50 metres to 180 metres.

The visibility meter consists of a series of 14 ground-glass discs of graded degrees of mattness, any one of which can be placed in front of the observer's eye. A measure of the distinctness with which an object is seen is given by the number of the disc through which, when the object is viewed, it becomes just unrecognisable from the surroundings. Wigand fixed the scale of the instrument in such a way that when an object, having very good contrast from the surroundings is viewed in perfectly clear weather through disc No. 14·3, the object would become just invisible. The grading of the discs is such that two discs with numbers m and n when superposed produce the same effect as a single disc of number $m+n$.

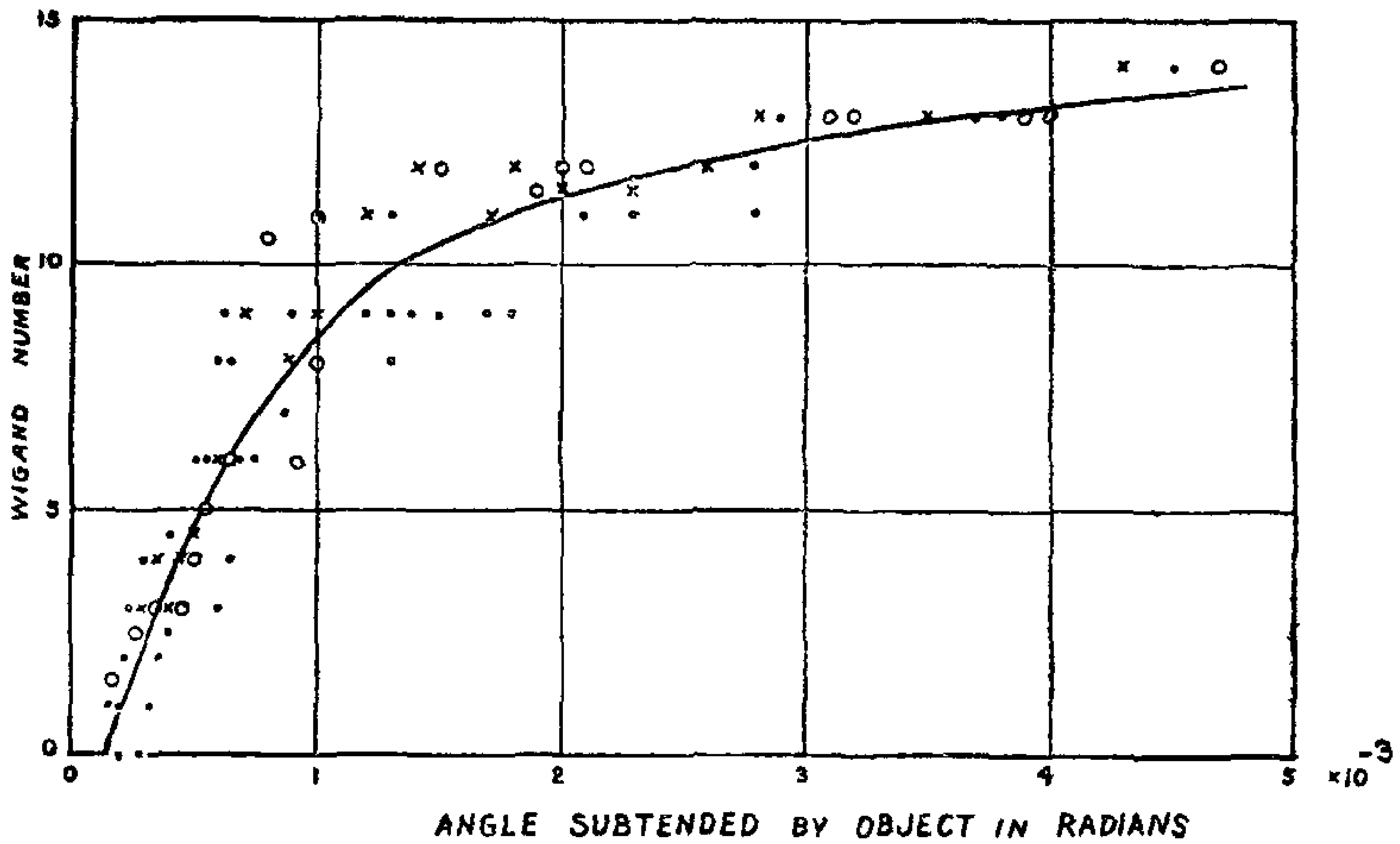

Fig. 1.

White object against black background. Illuminated by sky-light.

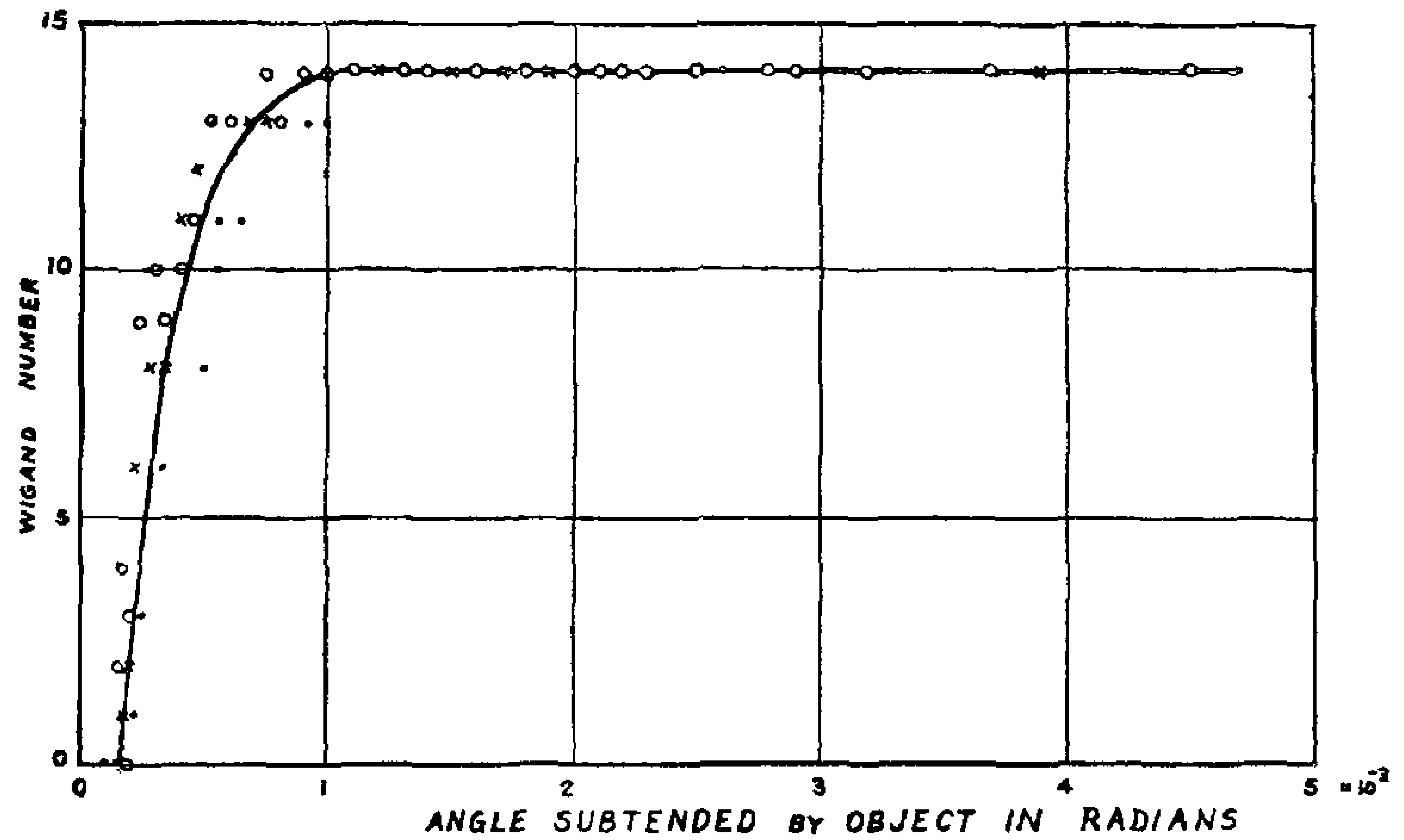

Fig. 2.

White object against black background. Illuminated by sunlight.

The observations taken on a number of *very clear* mornings with different sizes of objects and different distances of observation are plotted in Fig. 1. Separate signs are used to indicate observations taken on different days. The continuous line is the mean curve drawn through the plotted points. In order to bring together all observations to the same scale, the angular size of the object at the observer's eye is plotted against the distinctness with which the object was seen (as measured by the disc-number of Wigand Visibility-Meter at the threshold of recognition). It will be seen that as the object increases in size from a very small value, the distinctness increases rapidly up to an angular size of about $1 \cdot 5 \times 10^{-3}$ radians or (5′ of arc) and thereafter the increase is much less rapid. The Wigand number practically approaches the value 14 when the angle is 5×10^{-3} radian or 17′ of arc. 0·5° seems to be a safe lower limit of size for visibility landmarks.

As one may expect, there is a dependence of visibility on the lighting of the object. Another series of observations taken in the evening, also in very clear weather but with sunshine falling on the board, are plotted in Fig. 2. In this case, as the apparent size of the object decreases, the distinctness is little affected until a size of about 3′ is reached after which it diminishes very rapidly. The difference between the curves when the illumination on the object is altered shows that if a distant tower or pillar is chosen as a visibility landmark, the estimated visibility will, other conditions remaining the same, depend also on the relative position of the sun, observer and object.

The bearing of these results on the problem of determining vertical visibility in the atmosphere by observations of pilot balloons is obvious but this question is complicated by a number of other factors, such as the size and colour of the balloon, the colour and brightness of the sky, the altitude of the balloon at which observations are taken, the manner in which the transparency of the atmosphere varies in the vertical, etc.

The Wigand Visibility-Meter used for the above observations was kindly loaned by the India Meteorological Department. The observations were taken at the suggestion of Dr. K. R. Ramanathan, Meteorologist.

Occurrence of *Derris elliptica* in India.

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DERRIS root is at present an important article of trade since it is a potent insecticide, acting both as a contact and stomach poison to aphids and caterpillers infesting vegetables and fruits. Moreover, being non-poisonous to man and animals, it is preferred to arsenical and other poisonous insecticides used as spray or dust on vegetable food products. In animal husbandry it has proved very effective against "Warble Fly", poultry pests such as "Red Poultry Mite" and it forms the basis of some proprietory sheep dips. In view of these uses there is a growing demand for Derris and the supply of good quality Derris root does not appear to be in excess of the demand at the present moment.

Derris is a general name applied to several species of Derris, native, throughout the Tropics. But *Derris elliptica* and *Derris malaccensis* are at present the chief source of Derris of commerce and they come mostly from Malaya, Sarawak, British North Borneo and the Dutch East Indies where the cultivation of these species has greatly been increased—within recent years. In Philippines,[1] Belgian Congo,[2] New Guinea[3] and other places where *Derris* species are indigenous, attempts are being made to increase the production by cultivation of suitable strains.

Several species of Derris are known to occur in India; of these *Derris robusta* and *Derris scandens* were examined by McIndoo, Sievers and Abbott[4] in 1919 and both were found to be avoid of insecticidal properties. *Derris uliginosa*, which occurs in fair abundance in certain parts of Bengal and Assam, was examined by Tattersfield in 1926–27 and was found to possess very little insecticidal properties. *Derris elliptica*, which is known

[1] *University of the Philippines Natural and Applied Science Bull.*, Oct. 1933, **3**, No. 2.
[2] *Bull. Agricole du Congo Belge*, 1934, **25**, No. 3.
[3] *The New Guinea Agri. Gazette*, 1935, **1**, 38.
[4] *Jour. Agr. Research*, 1919, **17**, 177-200.