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SELENOLOGY AND COSMOGEOLOGY

COSMIC AND GEOLOGIC IMPORT OF THE LUNAR FEATURES

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APOLOGY: In slight excuse for trespassing in the astronomic field it may be said that a geologist, cooperating with an astronomer, showed the fallacy of the nebular hypothesis, which had been cherished by astronomers and selenographers for more than a century; and that a student in geology may have some reasonable ideas in selenology.

Thesis: The basins and pittings of the lunar surface are impact craters and are ocular confirmation of the view that the planets and satellites were built by cold accretion. This implies acceptance of the planetesimal hypothesis of Chamberlin and Moulton. The genesis, growth, history and structure of the earth and moon are here considered from the planetesimal view-point.

Ever since Galileo first peeked at the moon through his crude telescope, the lunar surface has been perhaps the most singular, fascinating and puzzling of telescopic objects. Galileo's surprise and delight have been reexperienced by all observers, and for four centuries selenography has been a favorite pastime for sky-gazers. Description and portrayal of the so-called craters and of the plains, mountains and the many peculiar features make an extensive literature. In recent time photography has largely displaced pen and pencil. Naturally the moon has been the subject of much speculation and imaginings and the cause of superstition and mental aberration. Scientific literature includes much lunar description that is unscientific and even unreasonable. The most pretentious treatise on the moon in American literature argues for the existence on the moon of atmosphere, snow, ice and vegetation. This ignores the heated condition of the surface during the long lunar day. It would be a new

TABLE 2

EFFECT OF VITAMIN B_1, NICOTINIC ACID (0.5 MG PER LITER) AND "PEA ROOT AMINO ACID MIXTURES" DONE IN COMBINATION, ON THE GROWTH OF ISOLATED PEA ROOTS

Growth factors added	Growth in mms per week, average for 2 weeks		
	II and III	IV and V	VI and VII
B_1	41.1	23.6	11.6
Amino acids	32.5	22.1	5.9
Nicotinic acid	45.8	25.0	9.2
Nicotinic and amino acids	46.3	18.4	16.2
B_1 and amino acids	47.0	30.1	20.1
B_1 and nicotinic acid	55.8	70.6	72.6
B_1, nicotinic acid and amino acids	54.2	68.6	77.7

growth rate with each weekly transfer. Nicotinic acid alone, however, supported growth of the isolated pea root at least as well as did vitamin B_1. Combination of the amino acid mixture with either nicotinic acid or with vitamin B_1 supported the growth at a somewhat higher level than did either substance in the absence of the amino acid mixture. Combination of nicotinic acid with vitamin B_1 or with vitamin B_1 and the amino acid mixture, on the other hand, resulted in a steady increase of growth rate. This increase has been found in several different experiments and is of the order of 50 per cent. above the initial level. Although the experiment recorded in Table 2 was maintained through only 7 weekly transfers, a second experiment was maintained through 10 weeks with undiminished rate of growth of the roots which received nicotinic acid in addition to vitamin B_1 and the amino acid mixture (Fig. 1). Such roots were indistinguishable in appearance (except for their greater length) from roots which had been but 2 weeks in culture.

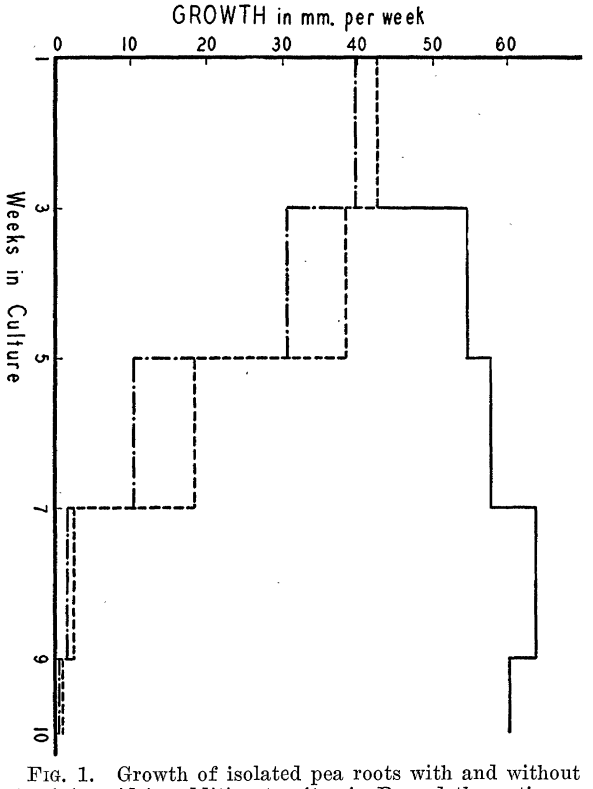

FIG. 1. Growth of isolated pea roots with and without nicotinic acid in addition to vitamin B_1 and the optimum mixture of amino acids: Solid line, nicotinic acid plus vitamin B_1 plus amino acids; dotted line, vitamin B_1 plus amino acids; dot and dash line, vitamin B_1 alone. Nicotinic acid was introduced into the medium of part of the series which had been cultured in vitamin B_1 and amino acids at the end of the third week. No accessory growth substances are added to the roots during the first week.

Although the data presented (in Table 2) do not yet permit of a definitive decision, still it seems possible that the amino acid mixture is not essential to the continued optimal growth of isolated pea roots. Nicotinic acid, however, must apparently be regarded as a factor quite as significant as vitamin B_1 in the nutrition of the isolated pea root. The promotive influence of nicotinic acid on the shoot growth of the isolated pea embryo[8] also must in all probability be attributed to the effect of this substance on the growth of the root.

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[8] J. Bonner, *Plant Physiol.*, in press.

BOOKS RECEIVED

ALBERT, ARTHUR L. *Fundamental Electronics and Vacuum Tubes.* Pp. ix + 422. Illustrated. Macmillan. $4.50.

ANSLEY, A. J. *An Introduction to Laboratory Technique.* Pp. xiii + 313. 121 figures. Macmillan. $4.50.

BEAN, R. BENNETT. *The Peopling of Virginia.* Pp. viii + 302. Illustrated. Chapman and Grimes. $3.00.

BINGER, WALTER D. *What Engineers Do; Engineering for Everyman.* Pp. xviii + 304. 111 figures. Norton. $2.75.

BRANSON, E. B. *Stratigraphy and Paleontology of the Lower Mississippian of Missouri.* Pp. 208. 9 figures. 20 plates. University of Missouri. $1.25.

CHAPMAN, KENNETH M. *The Pottery of Santo Domingo Pueblo; A Detailed Study of Its Decoration.* Memoirs of the Laboratory of Anthropology, Vol. I. Pp. 192. 79 plates. 34 figures. The Laboratory, Santa Fé, New Mexico. $4.00.

COE, CARL J. *Theoretical Mechanics; A Vectorial Treatment.* Pp. xiii + 555. 102 figures. Macmillan. $5.00.

MCBRIDE, J. FRANCIS. *Flora of Peru.* Pp. 665–1136. Field Museum. $2.50.

Memoirs of the College of Science, Series B, Vol. XIV, No. 2, (Articles 6–15). Pp. 155–352. Illustrated. Kyoto Imperial University, Japan.

National Research Council. *Transactions of the American Geophysical Union; Regional Meetings, Reports and Papers; Part I,* Sections on Geodesy, Seismology, Meteorology, Terrestrial Magnetism and Electricity, Oceanography, Volcanology and Hydrology. Pp. 585. *Part II,* Sections on Hydrology and Western Interstate Snow-Survey Conference. Pp. 588–744. National Academy of Sciences.

NEBLETTE, C. B. *Photography, Its Principles and Practice.* Third edition. Pp. xi + 590. 229 figures. Van Nostrand. $6.50.