

order, and Einstein does *not* repeat Soldner's mistake.

(6) Soldner does not mention the application of this problem for testing the theory of light which is the principal purpose of Einstein.

This comparison sufficiently shows the independence of Einstein's work even if he knew about Soldner's paper, which is not likely, as Soldner's result had fallen into oblivion following the rejection of the corpuscular theory of light on which it is based. Professor See, accusing Einstein of plagiarism, clearly has not read Soldner's original paper and has been misled by a fragmentary reprint⁶ of it published in 1921 together with comments by a German physicist, P. Lenard.⁷ In these comments (page 603) Lenard transforms Soldner's formula into a notation and form similar to that employed by Einstein. Professor See mistakes Lenard's transformed formula for Soldner's and bases his unfounded accusation upon its similarity to Einstein's result.

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LICK OBSERVATORY

A RECESSIVE BLACK VARIETY OF ROOF RAT

THE pelage color of most wild mammals is characterized by a rhythmical deposition of dark and light pigments in the hair, giving rise to what is termed an agouti pattern. One of the common variations occurring in agouti animals is the disappearance of the bands of yellowish pigment, which results in a totally black coloration, provided no other variations are present simultaneously. It is known that mammals may be black genetically, for one or other of the following reasons: (1) Because they possess a dominant or incompletely dominant extension factor, which extends the dark pigments into the regions ordinarily occupied by the lighter ones only, as in "steel gray" rabbits;¹ (2) because they possess a recessive non-agouti factor which precludes the formation of light pigments in the hair with the dark ones. Most black varieties of domesticated animals belong to the latter class.

The natural color of the black rat, *Mus rattus*, is a uniform black, which has been found to be domi-

nant over the agouti of the closely allied roof rat, *Mus alexandrinus*.² This case obviously falls into the first of the above-named categories. Black individuals obtained from a stock received from Mr. H. C. Brooke of Taunton, England, were at first supposed to be specimens of the dominant black derived from *M. rattus*. These blacks were produced in matings between grays and yellows, and it was assumed at first that black would be found to be dominant over gray as in Morgan's experiments. The incorrectness of this assumption was apparent when gray mated to gray produced litters containing black animals; six black rats produced in this way have been recorded. Matings of such black males to wild gray *M. alexandrinus* females have resulted in the production of seventeen offspring, all of which are gray.

This evidence indicates very clearly that we have in this black variety a color factor which is different from the one characterizing the black rat, *Mus rattus*; one which is recessive to gray or agouti, and which is probably the homologue of the factor producing the black variety in the Norway rat, the house mouse, the guinea-pig and the rabbit.

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QUOTATIONS

A "ROSS INSTITUTE"

THE approaching twenty-fifth anniversary of Sir Ronald Ross's epoch-making discovery that malaria is transmitted to man by the mosquito has led a number of influential persons, including leaders of the profession in this country, Mr. H. H. Asquith (ex-prime minister), Dr. Roux, director of the Pasteur Institute, Paris; Dr. R. M. Strong, of Harvard University; Dr. William H. Welch, of Johns Hopkins, and Sir Charles Sherrington, president of the Royal Society, to make an appeal to the public. They point out that the discovery has revolutionized medical science and living conditions throughout the tropics and, among other great things, enabled the Panama Canal to be constructed. It is impossible to exaggerate the services Ross has rendered. He must be ranked among the great investigators whose labors, like those of Pasteur, Lister, Jenner and Golgi, have conferred inestimable and lasting benefits on mankind. All the world has shared in these benefits, but Great Britain, which has vaster tropical areas than have ever been ruled by a single power, has profited most abundantly, and she owes a very special debt of gratitude to the son who has rendered this service. There is in

⁶ "Annalen der Physik," 65, 593, 1921.

⁷ Lenard, it should be said, recognizes the error in Soldner's work to which attention is called in this paper and gives correctly the value for the deflection to which Soldner's theory leads. It may further be stated that Soldner's result for the light deflection by the Earth $\omega = 0''.001$ is also in error and should be $\omega = 0''.00014$ (in addition to the erroneous factor 2 in the formula a mistake was made in calculating the value of the acceleration for the peculiar units used).

¹ Punnett, R. C., 1912, *Jour. Genet.*, 2, 1915; *ibid.*, 5.

² Morgan, T. H., 1909, *Am. Nat.*, 43.

process of organization an institute to be called the "Ronald Ross Clinique for Tropical Diseases and Hygiene," in which it is proposed that laboratory research and clinical investigation shall be combined as closely as possible in accordance with his teaching. There are already in this country two schools of tropical medicine which have done good work, but their activities are in the main educational. It is proposed that the institute shall supplement and not compete with them; that its primary object shall be research, that a clinical establishment shall be maintained in intimate conjunction with the laboratories, and that the master mind of Ross, assisted by other experts, shall have the fullest scope for the initiation and continuation of researches into the still unsolved problems of tropical medicine. There is a Pasteur Institute in Paris; a Kitasato Institute in Japan; a Gorgas Institute in Panama. It is strongly felt that Great Britain should honor one of her greatest investigators by establishing a Ross Institute in London. To initiate this, \$250,000 is required. The public is invited to send subscriptions to the honorary treasurer, Lord Willoughby de Broke, 29 Queen Anne Street, London.—*The Journal of the American Medical Association*.

THE DIRECTORSHIP OF THE RECLAMATION SERVICE

SECRETARY WORK might have given a shorter explanation of the recent removal of Arthur Powell Davis, Director of the Reclamation Service, which would have been more convincing. If he had merely said that Mr. Davis was turned out to make room for a practical politician, that would have been enough.

In his long letter addressed to the American Society of Civil Engineers, Secretary Work labors the point that the time when engineering skill and experience were of first importance in the Reclamation Service is past and that the need now is for "a practical business man familiar with conditions peculiar to irrigation in the West" as Director. The facts are that Arthur Powell Davis was for twenty-one years an engineer in the Reclamation Service, that since 1914 he had been director, and during his term of service all the large storage dams of the West were constructed and others begun, and that Gov. D. W. Davis, of Idaho, who succeeds him, has been known only as a grocer and banker who entered state politics.

The charges that big power interests have conspired to bring about the removal of the distinguished engineer because they are opposed to the Government's policy in reclamation and Arthur Powell Davis's part in it under successive administrations Secretary Work passes over in silence. His answer to the engineers is lame and evasive. To confess the truth would be to

admit the unworthiness of his own motives in removing from office Arthur Powell Davis to make room for an Idaho politician.—*The New York World*.

SPECIAL ARTICLES

THE VIBRATIONAL ISOTOPE EFFECT IN THE BAND SPECTRUM OF BORON NITRIDE

THE quantum theory of band spectra¹ indicates that there should be quite appreciable differences between the spectra of isotopic molecules. This is essentially because the spectroscopic frequencies, or, rather, such portions of them as are due to changes in molecular vibrational energy, should be proportional to actual molecular vibration frequencies. The expected isotope effect has already been found² in one of the *infra-red absorption* bands of hydrogen chloride; here the absorbed energy is nearly all vibrational.³ A displacement of 0.055 A.U. has also been found in a comparison of certain lines in the *visible emission* bands of two samples of lead of different atomic weight. Here the emitted radiant energy is partly vibrational, partly electronic in origin.⁴

A much more favorable case than the two foregoing is to be found in boron nitride. Here the vibration frequency should be 2.76 per cent. greater for the lighter isotope $B_{10}N$ than for the heavier, $B_{11}N$, as compared with 0.08 per cent. for HCl and perhaps 0.04 per cent. for lead. The ratio of abundance, 1:5 from the atomic weight 10.83 (Baxter & Scott), is of course somewhat unfavorable. Jevons⁵ has measured the heads of two systems of bands which he has satisfactorily shown to be due to boron nitride. In addition to the main " α " and " β " systems, he found certain less developed "subsidiary systems," β_1 and β_2 , related to the β system, as well as some extra bands not fitting any system.

Theory predicts that for the band due to the passage of a vibrationless, but electronically excited molecule, to an electronically less excited, and still vibrationless, state, there should be *no isotope effect*

¹ See, for example, Sommerfeld, "Atombau und Spektrallinien," 3rd Ed., Chap. VI.

² Loomis, *Astrophys. Journal*, 52, 248 (1920); Kratzer, *Zeit. für Physik.*, 3, 460 (1920).

³ There is also a change in molecular rotational energy involved, with a corresponding isotope effect. This is, however, usually a minor factor, and will not be considered in the following discussion.

⁴ Grebe and Konen, *Phys. Zeit.*, 22, 546 (1921). The emitting molecule is probably that of some lead compound.—The effect should not be confused with those observed in the *line* spectra of lead isotopes.

⁵ W. Jevons, *Roy. Soc. Proc. A*, 91, 120 (1915).