THE ATOMIC WEIGHT OF LEAD

Katanga Pitchblende

Wt. of $PbCl_2$ in vacuum g.	Wt. of Ag in vacuum g.	Ratio $PbCl_2$: 2Ag	At. wt. of Pb.
4.57229	3.56261	1.28341	206.00
6.20083	4.83143	1.28344	206.00
4.45462	3.47094	1.28340	205.99
	Average	1.28342	206.00
	Katanga Pitchblende Extract		
2.62575	2.04615	1.28326	205.96
3.75342	2.92474	1.28333	205.98
3.28347	2.55867	1.28327	205.96
3.19222	2.48745	1.28333	205.98
	Average	1.28330	205.97
	Bedford Cyrtolite		
0.59044	0.46015	1.28315	205.94
	Common Lead		
2.56818	1.99234	1.28903	207.21
4.34481	3.37050	1.28907	207.22
	Average	1.28905	207.21

posed of the isotopes Pb^{206} and Pb^{207} in the proportions of 14 to 1. From this evidence the isotopic weight of Pb^{206} would seem to have the surprisingly low value 205.90–205.93.

It is difficult to explain the difference in the atomic weights of the lead from the black and yellow portions of the original mineral. If the veins were formed by infiltration, an external source of lead of atomic weight 205.97 is required. If, as seems more probable to us, the yellow material is an alteration product, it might indicate a different rate of decay of uranium isotopes, as v. Grosse has recently proposed.[4] But since then the yellow material must contain on an average older lead than the black, this hypothesis would require a higher rate of decay for U^{238} than for U^{239}, a conclusion which is contrary to v. Grosse's.

G. P. BAXTER
C. M. ALTER

T. JEFFERSON COOLIDGE, JR.,
MEMORIAL LABORATORY OF
HARVARD UNIVERSITY

FREE POSITIVE ELECTRONS RESULTING FROM THE IMPACT UPON ATOMIC NUCLEI OF THE PHOTONS FROM TH C″

THE discovery of the fact that free positive electrons are present among the secondary particles resulting from the disruption of nuclei by the cosmic radiation,[1] together with various kinds of evidence that the primary cosmic radiation at sea-level consists largely of photons, made it appear of value to study the hard γ-rays of natural radioactive substances for similar effects. Experiments have been carried out which gave conclusive evidence that positrons[2] are ejected from lead by the γ-radiation of Th C″.

Near the bottom of a vertical Wilson cloud-chamber operating in a magnetic field of about 400 gauss a plate of lead was placed through which a collimated pencil of γ-rays from Th C″ was allowed to pass. About 5 cms above the lead was inserted an aluminum plate of 0.5 mm thickness for the purpose of differentiating between particles of positive and negative charge, a method previously used by the author and later by Blackett and Ochialini for the same purpose.

Out of 1,500 exposures three photographs were obtained, each one of which showed a positron ejected from the lead, the direction of ejection being nearly in the direction of the incident γ-ray beam. The positrons penetrate the aluminum plate and emerge with an appreciably lower energy; in all three photographs the tracks cross practically the whole chamber, and their curvatures are readily measurable and of the right order of magnitude. The general indications are that the positrons are not very rare among the electrons ejected from the lead.

These photographs offer unambiguous evidence that photons when absorbed by nuclei do eject both positive and negative electrons quite in accordance with the evidence which has appeared in cosmic-ray studies. Further, many of the tracks which we have obtained from the γ-rays of Th C″ resemble the showers such as those obtained by us[3] and particularly emphasized in the photographs of Blackett and Ochialini.[4]

I wish to express my gratitude to Mr. Seth H. Neddermeyer, for his assistance and to the Carnegie Corporation for their support of this whole program.

CARL D. ANDERSON

CALIFORNIA INSTITUTE
OF TECHNOLOGY

METHOD OF EXTRACTION OF SUPRARENAL CORTICAL HORMONE-LIKE SUBSTANCE FROM URINE

IN view of the physiological significance of the possible presence of a substance in the urine that raises the resistance of suprarenalectomized rats to histamine poisoning,[1] the exact method of extraction of this substance is given below:

[4] *Phys. Rev.*, 42: 565, 1932.
[1] SCIENCE, 76: 238, 1932.

[2] The contraction positron is here used to denote the free positive electron.
[3] C. D. Anderson, "Cosmic-Ray Bursts," *Phys. Rev.*, 43: 5, 368, March 1, 1933.
[4] *Proc. Roy. Soc.*, 139, 699, 1933.
[1] D. Perla and J. Marmorston-Gottesman, *Proc. Soc. Exp. Biol. Med.*, 28: 1024, 1931.

The urine of young adult males and females is collected during the evening and night in large amber-colored bottles, packed in ice and containing a small cube of CO_2 snow; 50 cc of benzene is added to each bottle. A large funnel is inserted through an opening in the cork of the bottle, and the stem of the funnel is closed by a cork attached to a long glass rod. When in use this cork is removed and urine passed into the funnel. The cork is then immediately replaced. This method of collection results in a minimal amount of decomposition of the urine and keeps the freshly voided urine cold in an atmosphere saturated with CO_2 and under a layer of benzene. The following morning the bottles are removed to a dark room and the urine extracted with 50 cc of benzene for each liter of urine. An electrical mechanical mixer with a small fan-shaped stirring rod is used for agitation and extraction. The extraction with benzene is continued for from 10 to 15 minutes, and repeated with fresh benzene. The benzene is separated, and the fractions pooled and evaporated at 40° in vacuo to dryness. The residue is taken up in ether, the ether evaporated and the ether residue is shaken with the desired amount of physiological saline. The final aqueous product is colorless, has no odor of urine, turns faintly pink in 20 hours, and is non-irritating to rats when injected subcutaneously or intraperitoneally. The final product is made so that 1 cc of the extractive is equivalent to 300 cc of urine. The potency of such extracts will vary with the concentration of the original urine. The precautions employed in the collection of the urine minimize the effect of light and oxidation of the substance in the urine.

Although the substance obtained by the above method from urine raises the resistance of suprarenalectomized rats to histamine poisoning, as also does the life-prolonging hormone of the suprarenal cortex, proof is lacking that it is identical with the life-prolonging hormone.

DAVID PERLA
J. MARMORSTON

PRELIMINARY REPORT ON REDUCING TRANSPIRATION OF TRANSPLANTED EVERGREENS

IN the semi-arid Great Plains Region, coniferous evergreens are the most desirable shelterbelt trees and are the most permanent when once established. Unfortunately, their mortality in transplanting is particularly high, losses of 50 to 100 per cent. being not uncommon on prairie farms. Probable factors responsible for this loss are: (1) Climatic conditions favoring a high transpiration rate; (2) necessity of moving evergreens in full foliage; (3) slow rate of regeneration of roots destroyed in digging and resetting.

Since the fall of 1931 the Cheyenne Horticultural Field Station has been investigating means of reducing the transpiration rate of transplanted conifers. Through the work of Neilson[1,2] and others[3,4,5] the coating of dormant deciduous nursery stock for protection in storage, shipment and transplanting is being used to some extent in horticultural practise. Following the work of these investigators, various materials have been applied to the above-ground parts of dormant conifers in an attempt to cut down excessive transpiration of transplants until the damaged root systems can develop sufficiently to again support the trees.

Many materials have been tested, consisting chiefly of waxes, gums, resins, oils and asphaltic compounds, alone, and in various mixtures. Proprietary preparations employed included a rubber compound, a special petroleum wax, a Duco formula, a paraffin emulsion and four commercial nursery waxes. Early in the trials it was found that waxy materials which gave thick and nearly complete coverage of coniferous needles reduced transpiration almost to nothing; however, such heavy coatings caused severe injury to the plants. The temperatures at which materials can safely be applied to dormant evergreens is much lower than for dormant deciduous trees, but varies somewhat with different species, *e.g.,* Colorado blue spruce (*Picea pungens*) can not safely be treated with materials above 65° C., while yellow pine (*Pinus ponderosa*) can stand 5 to 10 degrees higher. Difficulty of securing thin coatings of waxy materials at these temperatures led to the use of pure oils and emulsions of oils and waxes which can be applied with a sprayer. Of the many oils tested, castor oil and corn oil were the only ones that did not injure the conifer needles when applied in pure form. Emulsifying some of the injurious oils greatly reduced or entirely removed their toxicity.

The non-toxic oils and several emulsions of oils and waxes have been tested on different typyes of conifers

[1] J. A. Neilson, "Paraffine Wax—an Aid to Growth in Transplanted Trees and Shrubs," *North. Nut Grow. Ass'n. Proc.*, 19: 44–51. 1928.

[2] J. A. Neilson, "Reducing Storage and Transplanting Losses in Nursery Stock" *Flor. Exch. and Hort. Trade World,* 78: (No. 5) 27, 35. 1931.

[3] C. N. Pillsbury, "The Use of Rubber in the Propagation, and for the Protection of Nursery Stock," *Flor. Exch. and Hort. Trade World,* 77: No. 17, 28–29, 41. 1931.

[4] H. B. Tukey and Karl Brase, "The Effect of Paraffining, Pruning and Other Storage Treatments upon the Growth of Roses and Cherry Trees, *Am. Soc. Hort. Sci. Proc.,* 28: 489–495. 1931.

[5] T. J. Maney, "An Apparatus for Spraying Plants with Melted Paraffin or Other Waxes," *Am. Soc. Hort. Sci. Proc.,* 28: 496–497. 1931.