

the effect of various concentrations of zinc, there was fairly good growth in the low zinc series. However, there was practically no growth of shortleaf pine in any concentration below the control.

These data clearly indicate that in addition to *P. radiata*, both loblolly and shortleaf pine require zinc at approximately .1 ppm for continued normal growth. In addition, there appears to be a marked difference in the nutrient requirements of loblolly and shortleaf. The symptoms of zinc deficiency produced in both species closely resemble those described for the little-leaf disease that has been reported to affect shortleaf and to a lesser extent loblolly in the Piedmont area (6). As to whether the little-leaf disease is in truth a zinc deficiency this experiment is not designed to answer. It may be that the disease is caused by factors such as fungi, nematodes, poor aeration, etc., which affect the absorption of zinc, with consequent production of zinc-deficiency symptoms.

Perhaps the most striking result of the experiment is the establishment of such great differences in the response of the two species to the various levels of zinc. The difference is of such magnitude as to suggest a basic difference in various physiologic processes. More extended investigations are currently in progress; they will deal not only with the effect of other nutrient elements but also with the effect of the presence or absence of mycorrhiza.

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## Comments and Communications

### Scientific Documentation through Cooperation

SOME comment should be made on the note by Jacques Avias on "International Organization of Scientific Documentation Based on Legislation" (*SCIENCE*, **115**, 250 [1952].) It happens that my fields of special study (paleontology and stratigraphic geology) are the same as those of M. Avias, and, like him, I am concerned with the problem of effective dissemination of knowledge in our subjects.

M. Avias would have laws forbidding scientific work to circulate unless accompanied by cards of standard size with abstracts in specified languages, unless special cards are deposited with specified international agencies, and so on. I find the thought of such coercive legislation very repugnant, and more than a little frightening. It would be unfortunate were our colleagues in other scientific fields left with the impression that bibliographic conditions in paleontology are so chaotic that such bureaucratic authoritarianism is warranted. The actual conditions are not ideal, but they are not thoroughly bad.

The geological (including paleontological) literature pertaining to North America, in its broadest sense, is listed in annual bibliographies with analytical indices, published by the U. S. Geological Survey and available to all at a very small cost. These bibliographies are amazingly complete, and are published as promptly as could be expected: the volume for a given calendar year appears during the next year, and commonly during the next summer.

For the literature of the rest of the world one must look farther, and coverage is not so perfect, but I think that comparatively few papers escape notice in

the *Bibliography and Index of Geology Exclusive of North America*, published annually by the Geological Society of America, Schindewolf's *Zentralblatt für Geologie und Paläontologie* (happily again appearing regularly, with admirable reviews), or the *Bulletin analytique*, the geological parts of which are reprinted in an annual volume by the Société géologique de France. Besides these inclusive listings, almost all countries have some agency publishing summaries of work of more local interest, such as the annual review of Swedish papers, which appears as part of the *Förhandlingar* of the Geologiska Föreningen i Stockholm. By consulting half a dozen sources (surely not an impossible task for a research worker), well over 90% of all papers in geology and paleontology will be found. For papers dealing with paleontology, abstracts and analyses are found in *Biological Abstracts* and the *Zoological Record*, as well as in the *Zentralblätter*. Coverage here may be described as good, although improvable and improving.

This result has been accomplished through no armament of laws, but by the geologists and paleontologists of the world working together through their professional societies, or through looser organizations like *Biological Abstracts*. No statute demands that copies of books or journals be sent to editors, although no doubt the editors are pleased, and their work is lightened, when this is done. I do not believe we need be ashamed of what has been accomplished bibliographically by free cooperation and informal zeal.

Granted that a worker may thus learn the titles of almost all papers in his field, does he then need the batteries of especially trained translators and the implied miles of filing cabinets in Paris (presumably in

the care of especially trained librarians), which M. Avias suggests? I think not.

If I find that a potentially interesting article has appeared, say, in the *Doklady* of the Russian Academy of Sciences, which we do not have in Delaware, am I blocked in my research unless some law compels the academy to provide me with a 3" x 5" card bearing an abstract in Spanish? Not at all. I go across the street to our librarian, ask him to borrow this issue for me on interlibrary loan, and he does so, with no fuss and little delay, because the librarians of this continent have pooled information on their holdings and accessions, and have agreed to lend to one another books needed for scholarly work. There are no laws and no top-heavy organization, but practically any book in existence is available to any worker, no matter how small or inadequate his local library may be. I can imagine no bureaucratic center for documentation serving scientists more efficiently, more smoothly, and more cheaply than our librarians now do.

For my European colleagues may I add, this is possible not only in a country with many libraries and no hampering political boundaries. While I was working in Canada, I could borrow books as readily from Harvard as I now can in Ohio.

Let us look around and see what has been accomplished by cooperation, and let us work to make this cooperation more effective. Without arrogance but with pride, let us show the results to those who claim that only through compulsion can scientific work flourish.

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## Has He a Rival?

WHO was the youngest person ever elected to membership in the AAAS? Probably it was William Fellowes Morgan, a grandnephew of Lewis Henry Morgan, the father of American anthropology.

The January 1945 *AAAS Bulletin* contains an article entitled "The Six Patriarchs of the Association," listing six members (at that time all deceased but one) each of whom had been members of the Association for at least 64 years.

One of the six is William Fellowes Morgan (1860-1943), who was a member of the AAAS for 65 years. He was elected a member in August 1878, when he was only 17 years old (his 18th birthday was on the following September 24). He was probably the youngest member the AAAS has ever had. He was elected a fellow of the AAAS in 1932 and an emeritus life member in 1933. He was associated with Section M. In 1880, William Fellowes Morgan was a member of the Association while his granduncle was president.

In addition to blood relationship and membership in the AAAS, William Fellowes Morgan and Lewis Henry Morgan were both successful businessmen and both trustees of Wells College. In 1868, the year that

Wells College (founded by Henry Wells, who was also a founder of Wells, Fargo & Co. just a century ago) opened, Lewis Henry Morgan was elected a trustee and served until his death in 1881. William Fellowes Morgan was a trustee for 25 years, for 13 of which (1927-39) he was chairman of the board.

TEMPLE R. HOLLGROFT

*Aurora, New York*

## Express Rates or Animals?

THE Railway Express Co. has applied to the Interstate Commerce Commission for another rate increase, of 25%. Since shipments by Railway Express of live materials, especially of mammals, are already penalized with twice the first-class rate, to which several increases during the past few years have been added, it will be a very costly proposition for researchers to use Railway Express.

So that the increase shall not be irrevocably passed by the Interstate Commerce Commission, I would like to call the bad situation to your attention, with the suggestion that you might alert colleges, universities, hospitals, and medical schools so that protests are made *in time*.

The rates are absolutely unreasonable. I get many complaints about the high costs of live research materials, but the doctors do not realize that in many shipments the railway expressing costs are higher than our materials. The Railway Express Co. should be brought to reduce the rate to that of other common materials or assume responsibility for proper handling—then the rate increase might be justified.

Unfortunately, we cannot ship large mammals by Air Express because the embargoes have been revoked only for smaller shipments. What is needed is stiff competition, so that they would have to give better service instead of asking for one increase in rates after another.

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## Reactions with *p*-Quinone Imides

RECENTLY, Adams and co-workers (1) have studied the additive reactions of *p*-quinone imides—e.g., with thiophenol, amines, various organic acids, and aromatic hydrocarbons.

As far as we are aware, the action of the Grignard reagents on *p*-quinone imides has not been investigated. We have found that 1:4-naphthoquinone dibenzenesulphonimide (II) reacts in an analogous way with ethyl- and phenylmagnesium halides to form the colorless additive products (mp 186°) from benzene (C, 61.7%; H, 4.7%; N, 5.9%; S, 13.5%; C<sub>24</sub>H<sub>22</sub>N<sub>2</sub>O<sub>4</sub>S<sub>2</sub> requires C, 61.8%; H, 4.7%; N, 6.0%; S, 13.7%), (mp 220°) from benzene (C, 63.5%; H, 4.5%; N, 4.6%; S, 10.7%; C<sub>28</sub>H<sub>22</sub>N<sub>2</sub>O<sub>4</sub>S<sub>2</sub>, C<sub>6</sub>H<sub>6</sub> requires C, 68.9%; H, 4.7%; N, 4.7%; S, 10.8%), respectively. *p*-Quinone dibenzenesulphonimide (Ia),