fact that "there is an insistent demand among botanists, especially among the non-taxonomists, that plant nomenclature should be unified and stabilized . . . the non-taxonomist wishes to have one name for one plant, constant, invariable, and everlasting throughout the world." We do not find that the "everlasting" part is an essential requirement. But if approximate *uniform names* do appear to be so universally desired, why not meet this requirement by the best means at hand? This would relegate to less importance the intricacies of application of the rules of nomenclature.

ALFRED GUNDERSEN
BROOKLYN BOTANIC GARDEN

NEW YORK CITY AN ASEISMIC AREA

DR. C. A. REEDS' article in SCIENCE of April 23, 1926, and other published statements of the same tenor prompt one to say that it is somewhat dangerous to call any district an aseismic area. Even if the evidence of aseismicity is based on records from a seismograph, caution is needed, as the majority of the world's seismographs are adjusted for recording distant earthquakes and make exceedingly poor records of small local earthquakes if they record them at all. Apparently the American Museum of Natural History seismographs failed to record the shake of June 8, 1916, that was felt in Eastchester, Mount Vernon and Scarsdale with estimated intensities varying from 3 to 5 on the Rossi-Forel scale. I have faint recollections of other shakes having been reported from the environs of New York City, but can not place my hands on the facts at present. Doubtless other tremors occur but are unnoticed on account of traffic. Earthquakes are not at all uncommon in the lower Mohawk valley.

R. H. FINCH
HAWAIIAN VOLCANO OBSERVATORY

SCIENTIFIC BOOKS

Aristotle. By W. D. Ross, M.A., fellow and tutor of Oriel College; deputy professor of moral philosophy in the University of Oxford, Charles Scribner's Sons, New York, 1923.

Aristoteles: Grundlegung einer Geschichte seiner Entwicklung. By WERNER JAEGER, Berlin, Weidmannsche Buchhandlung. 1923.

THOUGH what other cause lies back of it is still a matter of conjecture, it is doubtless due to the revival of classicism among all the cultured nations of the world that two works on Aristotle, the man, of such impressive merit should have appeared, one in Germany and one in England, almost simultaneously. One represents the consequential and ordered study of a German savant pursuing, only as a German professor can, the intricacies of the evidence of Aristotle's mental development. The other book is by an Oxford don, who has lately given the world probably the best text of Aristotle's "Metaphysics" which the world of science has ever seen. Ross's book is rather a discussion of Aristotle's different works from the standpoint of a critic, but it does not lack a tribute to his personality. It does not exhibit, however, so much how his mind, as every thinking man's mind in step with his age and in accordance with his environment does, underwent its evolution. This is the striking feature of Professor Jaeger's work.

Both Ross and Jaeger have gone far and done much to show us how sympathetic Aristotle was towards platonic philosophy and how loyal he was to his master during the years of his long nonage and long after it, but the modern testimony even as to this is not always so unqualified. It is Ross who says that in distinction from his scientific work in natural philosophy there is no page of his purely philosophical works which does not bear the impress of Plato. To this opinion Jaeger still more emphatically commits himself, and he supports it by an overwhelming array of citation in parallel columns which quite negative the assertion of Mabbott in a recent number of the *Classical Quarterly* that Aristotle was unsympathetic and superficial in his treatment of Plato. It is true, Ross admits, that even while in the Academy, in the first decades of his life, he carried his studies in natural philosophy far beyond what the school could teach him and he seems to have lectured there on rhetoric. Jaeger offers good evidence that pursuing this line and joining with Plato in opposition to and rivalry with Isocrates he subsequently developed the doctrines of his ethics.

After Plato's death his stay at the Academy, and indeed in Athens during the dominance of Demosthenes in politics, became impossible or at least uncomfortable. He took refuge at Assos, and it was along the coasts of Asia Minor that he pursued his study of biology and laid the foundation of that knowledge which still astounds modern scholars. He fished for specimens at Mitylene and in the lagoon of Pyrrha. His father had been a physician at the court of the Macedonian kings. He himself was about the age of Philip and became the tutor of Alexander at Pella when the latter was about thirteen. As the latter swept the enemies of himself and his father out of the mainland and the islands of Greece preparatory to his meteoric career in Asia, Aristotle returned to Athens in the rising Macedonian flood of empire and in 355–4 rented some buildings and established a school, the Lyceum, in a grove near the Ilissus where Socrates had wandered and talked not of science

but of love with Phaedrus. Here then it was that Aristotle must have first tried to get the gilded dandies of Athens to dip their fingers in the abdominal cavities of newts and lizards and crabs.

It is at first chiefly through the fragments of the lost dialogues of Aristotle that Jaeger traces the platonism which filled the mind of the young Aristotle and which he never entirely lost, but whatever his later guidance may have been the country lad of Stagira must have brought to Athens some knowledge of animal life from the marshy shores of Chalcidice, some glimmer of medical science from his father's surgery. In contact with these things, probably, he remained until he was seventeen, when his father died. In most boys of forward minds this is the age when the impressions made are the deepest and most lasting. Out of them the biology of the middle years may have emerged when he lectured at the Lyceum, near the Ilissus, and told the young fops fresh from the high life of the Athenian palestra that systematic science was of two kinds, one only, however, being scientific knowledge and the other educational knowledge—research science and class-room science, perhaps, he had in mind. The play of the mind in metaphysics, the wonders of the heavens above were all of them man's interest, but not less the marvels of life itself, he says in his "Parts of Animals." We must not revolt with childish aversion from the examination of the humblest animals. Every realm of nature is marvelous. I doubt if the roots of this can be found in his early platonism, and Jaeger does not suggest it, but when he began to stand on his own feet at the zenith of his manhood, he may well have harked back to the days of his boyhood when the marvels of life along the Aegean made their impression before the magnetism of Plato's personality drew him into the circles of academic thought, into metaphysics and the science of the soul.

This influence, possible enough at least, is not emphasized, but from the time he entered the Academy in 367 B. C. the evolution of his mind along the lines existent there springs clearly enough into view for the reader of either the German or the English volume. He apparently was second to none of the disciples of the master in eloquence. He measured foils even with Isocrates; both authors think and both quote the reference to Aristotle's golden stream of talk by Cicero, evidently impressed by that of the dialogues. Thus far as illustrated in this very generalized synopsis of certain features of the two books and in the thoughts to which these give rise, aside from the biographical facts in which they also coincide fairly well, the two authors are in marked agreement, but while Jaeger keeps his mind steadily on the growth of Aristotelian thought and theory and goes much further in tracing their affiliation with the thought and theory of Plato, Ross does not confine himself to this sort of evolutionary objectivity, but most of his book is taken up with a summary of Aristotelian doctrine, which frequently branches into discussion and criticism. Into this there is no space here to go, if we are to devote more of it to the rather unique analysis of Jaeger from a developmental point of view.

He starts with pointing out that in the histories of great thinkers and in the accounts of the evolution of independent creative characters one can not find such another example as this of where one man of nearly equally gifted originality came so intimately and so long under the influence of another commanding genius and stood so long in the latter's shadow. Aristotle came to Plato when the latter was sixty years old and was to live twenty years longer. At that time he had largely himself emerged from the divine aura of the influence of Socrates. In 367 Socrates had been dead more than thirty years. The "Charmides," the "Lysis," the "Laches," the "Apologia," the "Crito" were far back in the dead past. The "Phaedo" and the "Symposium" were alive in the memories of later scholars, but the epoch of platonic form to which these belongs was also closed when Aristotle was a novice. The "Philebus" had some of the old fire in it, but the "Theaetetus" must have greeted him and introduced to him a new aspect of the search after truth and the origin of knowledge. So far as one may judge from the fragments of the early dialogues of Aristotle they were replicas of platonic thought and the form he gave to the expression of it. The wonderful young Macedonian from the half barbarian land of magic was bewitched by the personality and the marvel of the ever-flowing streams from the mind of the great Athenian. He strove to match the magic of the master's dialectic and the traditions of his earlier dialogues, but they were virtually inimitable. They apparently flowed from the inspiration of Socrates, and when the glow from his memory sank below the horizon Plato himself was unable to reproduce it. Nothing since Plato's day has been so often tried, and since then there has been no imitation but has fallen flat. Some of the dialogues attributed to him may have been by his immediate pupils under his guidance and stimulated by his genius. In form or thought or both even these, but especially later imitations, lag so far behind those known to be genuine that there is comparatively little dispute about them. Aristotle's may have been among the best, but later he gave up, probably in realization of his limitations, that form of exposition altogether, and it is significant perhaps that the early dialogues have perished and his in-

dependent works have lived. None but the master could draw the master's bow, we may well believe.

In the "Eudemus" Aristotle treats of the soul as Plato did in the "Phaedo." Even though the neo-platonists regarded both as alike exposing Plato's original thought an earlier antiquity did not name them in the same breath. The "Eudemus" perished, the "Phaedo" lived and so did Aristotle's treatises, in his own manner, in an entirely different form. His "de Anima" ranks with some modern readers at least among the most attractive of the Aristotelian writings, but much in the "de Anima" formed a part of the "Eudemus," just as the "Eudemus" drew on Plato's "Phaedo."

It is true we can not follow everywhere a trail so clearly blazed as this, but Jaeger opens many a vista glancing down which we see the mighty figure of Plato standing at the start. In parallel columns he contrasts what Isocrates had to say in support of shirt-sighted ideals of education with a fragment of the "Protreptikos" of Aristotle urging the view of Plato, who, in advocating the broader view, opposed Isocrates as he rivalled him in his appeal for pupils. The evidence in this instance is not very impressive, but illustrates the extent to which Jaeger is ever ready to go in proving the reality of the early trend of Aristotelian thought in this sense. It is made much more clear by parallel columns that in the "Metaphysics" he followed the old path Jaeger picks out in the "Protreptikos," however little that had to do with Isocrates' "Warning to Demonikos." What more nearly concerns us, in the "Protreptikos," we are reminded by the emphasis he lays upon the exactitude of scientific knowledge that he leans to that kind of knowledge which Plato differentiates in the "Philebus" and in the "Timaeus," if I remember rightly, but this is not mentioned by Jaeger. It is an ideal rather than a practical knowledge observable by the senses and is thus safe from the fallibility and agnosticism of Protagorean doctrine. It is a part of theoretical as distinguished from empirical truth, which we have attempted and partly succeeded in approximating more closely than was possible for the ancients. The margin of error, however, still runs between them. I might further allude to the influence the astronomical views of Eudoxus had on both Plato and Aristotle. He came to Athens, it is said, in the same year as the latter and, though probably he was still further influenced by Kallippus after he had lost Plato and inaugurated the Lyceum, he based much of his "de Caelo" on the older man's astronomy. In much else which I must here omit, for instance, the influence of the Sicilian school of thought which so entangled Plato in more ways than one, we get the origin and growth of Aristotle's doctrines as noted by Jaeger. I must confine myself for lack of space chiefly to that bound up with the platonic origins.

When Aristotle had left the Academy after Plato's death it is believed he erected an altar to his memory somewhere in the plain of Attica. Many modern authors credit the belief advanced by some of the ancients in this, though the evidence seems to rest on a rather uncertain basis, but it is at least to be noted that some of the ancients, who lived not so long after him as some of these modern critics, thought it credible and therefore other stories not worthy of belief which told of Aristotle's estrangement from Plato before the latter's death. Naturally Jaeger finds this in line with the deductions he makes from the fragments of the dialogues and from various parts of the surviving texts of his later work. Dissensions sprang up in the Academy on Plato's death, and it is quite probable it was for the interest of some, perhaps individuals of both factions, to tell stories of Aristotle's disputes with Plato, vivacious discussions naturally arising on various subjects and fire being struck often no doubt from steel such as the minds of these two were made of. But aside from the legendary altar and its inscription "in the Cecropian Plain" Jaeger finds evidence enough to convince us of the force of his views. Indeed, any one reading Aristotle, as Ross specifically points out, will find numerous passages where Aristotle calls himself a platonist, evidently written long after Plato's death, but we may remark that these fragments of dialogues and these texts have seldom if ever hitherto received such a combing over as Jaeger gives them in support of his contentions, and what is far more noteworthy in a German paleographer he makes his story one of vital interest as well as a mine of information.

That Aristotle entirely rejected Plato's theory of ideas, that his politics is far more practical than Plato's "Republic," that his ethics are not precisely those of Socrates is sufficiently known to students, but future students will have no excuse for not knowing how much Aristotle owed Plato. His idea of the soul was practically Plato's carried into the details made possible by the turn he gave to it in his entelecheia and his teleology. The Unmoved Mover remained the Supreme God of Plato, with the difficulties of the conception more systematically discussed. He never freed himself from the oriental demons of the air which Thales received from Babylon. Socrates was frequently listening to one of them, idealized and an allegory for the "still small voice" of future Christians. It was the "light within" of George Fox, and Aristotle's entelechy is but the business end of such mysticisms applied to physiological ends.

Jaeger, still more for us than Ross, has made a loving and lovable personality of Aristotle. He has made him live and breathe for us. He mourns after

his friend, the Cyprian Eudemus, and dedicates a dialogue to him. He writes a moving hymn to Hermias, the uncle of his wife and his own benefactor. He erects an altar to Plato, his master. In his will he directs his bones shall lie with those of his wife Pythias, long since dead, and in accord with her own dying wish that wherever her husband should be buried, her own bones should be dug up and put in the same grave as his. He provides affectionately for his children and slaves. From the dull dialectician of our thoughts he becomes transformed into a personality of great attractiveness and stands side by side with Socrates and Plato as one of the moving figures of antiquity.

JONATHAN WRIGHT

PLEASANTVILLE, N. Y.

SCIENTIFIC APPARATUS AND LABORATORY METHODS

FACTORS THAT INFLUENCE LIFE AND GERMINATION OF COTTON SEED

IN one of our previous papers, we brought out the fact[1] that the temperature which cotton seed can endure, without affecting the vitality of the seed, depends upon several factors: First, the amount of moisture present in the seed; second, whether heated in dry or moist atmosphere; third, and perhaps the most important, whether there is oxygen present during the process of heating. We found that by thoroughly drying and heating cotton seed in a vacuum to prevent oxidation of the fats and proteins in the seed, they will endure a temperature of boiling water for hours without affecting their vitality.

M. J. Hondas and M. A. Guillaumin[2] found that the seeds of the *Gerbera jamesoni* quickly lose their germinative power when exposed to air, because of the alteration occasioned in their fixed or essential oils or in their other elements. In fact, it is impossible to obtain a single germination after a lapse of a single week. As the seed, deprived of albumen, contains alluron, he assumed that its alteration is due at least in part to the oxidizing action of the atmospheric oxygen.

M. A. Guillaumin, using the method employed by the author of storing seed in a vacuum, found he was able to preserve such seed for a long period of time. Since the heating of cotton seeds in a vacuum increased germination and lowered the activity of fungus diseases, we decided to study the effect of heating cotton seed in the presence of chemically inert gases, such as hydrogen, nitrogen and carbon dioxide.

Hydrogen was the first gas to be investigated. After the seeds had been dried at a low temperature, the tubes were filled with hydrogen at 100° C and at atmospheric pressure. The seeds were then subjected to a temperature of 100° C for twenty-six hours. Only in one series of experiments carried out did any of the seeds germinate and then the plants were not as vigorous as untreated seeds, planted on the same date and growing under same conditions.

Upon obtaining such low percentage of germination, oils of the hydrogen treated seeds were extracted with ether by the soxhlet apparatus and iodine numbers determined by the Hubl method. The iodine numbers found ranged from 82 to 99, while the iodine numbers of untreated seeds varied from 104 to 115, which shows that the unsaturated oils that were formerly present in the seed had become partially saturated. From these results we concluded that the oils had been changed by the hydrogen to such a state that prohibited their being hydrolyzed by the enzymes, in order to supply the embryo with necessary food for development. From our experiments there appeared to be no decrease in the activity of the enzymes, incident to heating the seed.

In order to obtain further information in regard to the nature of the absorption of the hydrogen by the oils in the cotton seeds, the tube containing the cotton seed was connected with a very sensitive manometer (see Fig. 1).

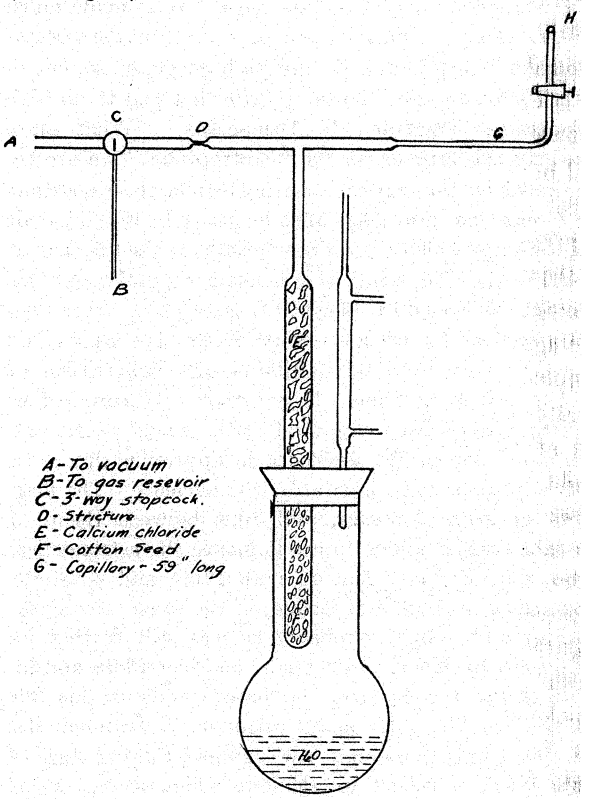

FIG. 1

[1] SCIENCE, Vol. LXII, No. 1487, p. 741.

[2] Bibliothèque Universelle Lausanne, Aug., 1923.