varieties of *Prunus serrulata* are proving to be much more reliable test plants for these viruses. When sweet or sour cherry buds having the latent virus complex as it occurs in Oregon are budded into these flowering cherries, a severe reaction occurs.

Kwanzan budded in August with sweet cherry buds containing virus, instead of producing normal growth the following spring, develops small curled leaves with split necrotic veins, which form tight rosettes with very little or no stem elongation. Small nursery trees may be killed, or may produce new growth only below the point of bud insertion. Often the sweet-cherry bud grows and develops in a normal manner and may be the only living branch on the trunk.

Buds from the same source placed into Shirofugen produce an entirely different reaction. If the buds are inserted in August, the area immediately around the bud becomes necrotic and the bud and budding rubber become embedded in a mass of black gum by fall. By spring the stem is completely girdled for 5 or 6 inches, but the foliage and new growth develop in the normal manner. About the time the first leaves have expanded to full size, entire spurs of foliage near the canker suddenly turn brown and die with the leaves still attached. This may gradually spread up one side of the branch or may move on all sides of the branch. As soon as the weather becomes warmer and drier, the entire branch beyond the point of bud insertion suddenly dies. Many of the branches now break over at the point of bud insertion, because this area has become much constricted. The necrosis spreads slowly down from the point of bud insertion and out into the laterals, causing cracking, constrictions and gumming, especially on the new or current-season lateral branches.

When Shirofugen is budded after growth starts in the spring, a similar reaction takes place. Necrosis occurs about the bud insertion and eventually girdles the stem. By fall the canker extends 2 or 3 inches each way from the point of bud insertion, but no symptoms appear on the foliage, until suddenly the entire branch dies. The stem is constricted below the canker, and gum is forced out in tendrils over the necrotic area.

Buds have been taken from several different trees of Bing, Lambert, Royal Ann, Black Republican, Black Tartarian and Montmorency sour cherry and placed on Kwanzan and Shirofugen. Of all the trees tested, only one tree of Bing and one tree of Black Tartarian have failed to give a positive test on these two flowering cherries. Preliminary tests with these two sweet cherry trees have also given negative tests for virus on Elberta peach and Mahaleb seedling. A much more extensive test is now under way to determine if these two trees are free from all known virus.

It is hoped that by testing enough trees one virus-free tree of each of the standard commercial varieties may be found that will serve as a foundation for future nursery stock.

There is some indication that some peach varieties may also carry a somewhat different latent virus that produces a local canker effect on Shirofugen.

A more complete paper on the above subject is being prepared.

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PENICILLIN SODIUM TREATMENT OF EXPERIMENTAL TRYPANOSOMIASIS OF MICE

THE following preliminary report offers the results of the experiences carried out in order to test sodium penicillin[1] against *Trypanosoma cruzi.*

Two groups of six mice each, weighing about 25 grams each one, were inoculated 33 and 16 days prior to the treatment with the same strain of *Trypanosoma cruzi* kept in our institute by successive passages through dogs.

The total individual dose administered was of 250,000 and 500,000 Oxford units per kilogram to 4 mice of each group. The infection in the 2 untreated mice served as control. The calculated individual dose of sodium salt of penicillin in 0.1 or 0.2 cc of saline solution was given intramuscularly five times daily at 3-hour intervals and twice at night with a 6-hour interval. The entire therapy covered a period of 84 hours.

Parasite observations were made 24 hours after the initial dose and every two days afterwards, for 10 days. The results of the therapy were negatives; both the treated and the untreated mice showed practically the same amounts of trypanosomes in the blood during the treatment and thereafter.

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A NEW QUARRY FOR JURASSIC DINOSAURS

A LARGE deposit of well-preserved dinosaur bones, heretofore undescribed, occurs in the Morrison formation, about 8 miles east of Cleveland, Emery County, Utah. The date and circumstances of original discovery are unknown, but the first systematic investigations were carried out by parties of University of Utah students, who obtained much excellent material. In 1938 the writer brought this deposit to the attention of Dr. G. L. Jepsen, professor of vertebrate

[1] The sodium penicillin was kindly supplied by Winthrop Products, Inc., through the courtesy of Laboratorios Winthrop Ltda., Chile.

paleontology at Princeton University. Grants from the W. B. Scott Research Fund supported a project of excavating and collecting at the site in the summer seasons of 1939, 1940 and 1941. Mr. Malcolm Lloyd, Jr., of Philadelphia, contributed generous aid in 1940 and 1941 and the site has been named the Malcolm Lloyd Jr. Quarry in appreciation of this support. Excavation and packing of the bones was done by the writer, assisted by his brother, L. G. Stokes, and by Don A. Hansen.

The deposit lies in the middle part of the variegated Brushy Basin member of the Morrison formation and bones are exposed for about 225 feet at the edge and surface of a low bench. The rocks dip about 3° northwestward and the overburden becomes increasingly thick in that direction. Over an area of approximately 200 by 75 feet the bone layer can be reached by ordinary open-cut methods. The fossils occur in a layer of marly clay about 2 or 3 feet in thickness and are intermingled with calcareous nodules and concretions. Although a few of the bones have the proper relationship to each other most of them lie in a disarticulated mass.

Partial remains of 19 individual dinosaurs were recovered from excavations which measure in plan about 35 by 25 feet. The specimens are referred to species within the following genera: *Diplodocus. Brontosaurus, Stegosaurus, Camptosaurus, Ceratosaurus* and *Antrodemus.* In addition, bones of a crocodile and teeth of an unidentified reptile were found. Most of the material which was collected has been cleaned and prepared but can not be studied adequately at this time. However, some of the general problems presented and partly investigated may be briefly noted.

Several theories are suggested by the physical characteristics of the Lloyd quarry, which may account for the accumulation of bones at that place. The characteristics of the enclosing sediments and the condition of the bones suggest that the dinosaurs died on the bed of an evaporating pond or lake and that the remains of animals already dead were trampled and disarranged by other dinosaurs in scavenging activities or in efforts to reach the last shallow pools of water. Overlying the bone bed is a 3- to 4-foot layer of almost pure bentonite containing fragments of zircon, quartz, plagioclase, mica and hematite. This material suggests a heavy fall of volcanic ash which could choke and absorb streams of water, overwhelm vegetation and cause widespread destruction. Volcanic activity may have contributed to the death of the dinosaurs at the site of the Lloyd quarry.

The siliceous nature of the bentonitic matrix in which the dinosaur bones were buried is probably responsible for their excellent preservation. Dinosaurs were perhaps no more numerous in Morrison time than in other parts of the Mesozoic, but burial in sediments favorable for petrification has provided a more complete record of this particular time than exists for any other part of the Jurassic.

Carnivorous dinosaurs outnumber the herbivorous types more than two to one in this deposit. In nearly all the other large Morrison bone beds the ratio is reversed and carnivores are rare. The unusually large proportion of carnivorous dinosaurs in the Lloyd quarry may be explained by the scavenging habits of *Antrodemus.* These carnivores may have congregated and perished from hunger among the bones of the herbivores.

This pit furnishes for the first time a fairly complete series of growth stages for a saurischian type of dinosaur. Regardless of whether *Antrodemus* was viviparous or oviparous little has been known of the early growth and development of individual animals. In the Lloyd quarry parts of 10 or 11 specimens of *Antrodemus* were found; these include individuals ranging from about 3 feet high and 6 feet long to 10 feet high and 25 feet long.

Many well-preserved jaws of *Antrodemus* containing full sets of teeth still in place were found and these have yielded new information on the manner of tooth growth and replacement. Although the potential number of teeth was evidently very high, replacements were not haphazard but took place in a definite order. Each tooth in use had next to it on each side either a young tooth coming into use or an old tooth about to be shed. *Antrodemus* was theoretically never left with a gap of more than one tooth's space on each maxillary or dentary bone at any one time, and each gap was flanked by fully functioning teeth of the next series. This process was continuous; excavations in the jaws have revealed three sets of teeth in addition to the two sets in use.

No so-called gastroliths were found with the dinosaur remains of the Lloyd quarry. This lack can not be attributed to the absence of particular kinds of dinosaurs, since all major types are represented. In beds about 200 feet higher there are numerous "gastroliths" but few bones. This evidence suggests that the highly polished siliceous stones so common in the Morrison have no relation to the digestive habits of dinosaurs. In the opinion of some observers the stones achieved their high polish by being exposed for long periods to wind-blown dust. There are, however, many peculiarities of distribution that are hard to explain by any theory except that the stones may have been picked up and carried around by animals.

A composite skeleton of *Antrodemus* composed of bones from several individuals from the Lloyd quarry is ready for mounting and installation after the war

in the Natural History Museum of Princeton University.

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THE "SCIENCE" TALENT SEARCH

THE "Science" Talent Search is in its fourth year. As a teacher of science (and a worker in plant pathology), the writer has regularly brought it to the attention of all science students, has complied with the rules of the contest and has sent the papers of the contestants to the examination committee. During these years, the writer has shared with others the feeling that this may not be a science talent search.

The implications for science teaching of this venture of Westinghouse is such that the methods which are being used, and the conclusions which are being derived, deserve the careful examination of every scientist and of every teacher of science.

Some thought has been given the matter.[1, 2, 3, 4, 5] One fact remains outstanding. The sponsors of the examination persist in calling this a "Science Talent Search" and are apparently heralding this far and wide in what appears to the writer to be a remarkable amount of advertising, in spite of the fact that no one yet knows (within the bounds of scientific method and scientific certainty) just what science talent is.

The sponsors of the examination have an excellent opportunity to gain for science a quantity of data which may determine just what makes a scientist. Assumptions have been made that if a student passes the complete examination (consisting of written examination, essay, interview and review of record) to the satisfaction of the examiners, he has science talent. As a matter of fact, by calling the contest "Science Talent Search," the sponsors seem to have accepted this assumption as a conclusion.

Is this conclusion valid?

Is it possible that students who can not succeed in the written examination and who were successful in the other parts, if given the publicity and opportunities afforded the winners, might make equally good scientists? Is it possible that students who are not among those who "pass" the written examination and who have poor "personalities" (as recorded by teachers), but who have a marked ability to work in high-school science, as shown by an actual undertaking of such work, might still become successful scientists, especially if they obtained the publicity and opportunities afforded the winner?

It is hoped that the sponsors of the Science Talent Search will not neglect the fine opportunity available to them to organize an investigation along experimental lines to determine the nature of science talent. The present Science Talent Search could well be called "Scholarships for Good Students with Present Interests in Science." It is, of course, entirely possible that all that is necessary to be a good scientist is to be a good student with an interest in science. Much would be accomplished if this could be proved scientifically.

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SCIENTIFIC BOOKS

BESSEL FUNCTIONS

A Treatise on the Theory of Bessel Functions. By G. N. WATSON. Second edition. vi + 804 pp. $7\frac{1}{2} \times 10$ inches. Cambridge University Press. New York: Macmillan. 1944. $15.

THIS excellent book was written at a time when the author was much interested in the propagation of electromagnetic waves over the surface of the earth, and consequently one of the important features of the book is that it contains material of interest to the radio engineer. Such a man is interested particularly in the asymptotic expansions of the Bessel functions, in definite integrals involving Bessel functions and in tables of Bessel functions. The subject of asymptotic expansions is treated with the thoroughness characteristic of a master in this field. It may be recalled that in 1912 Watson published in the Rendiconti di Palermo a memoir crowned by the Danish Royal Academy of Science in which among other things he gave expressions for the functions $J_n(x)$, $J_{-n}(x)$, $Y_n(x)$ and $K_n(x)$ as series of inverse factorials.

In Chapter III the Bessel functions of various types are defined for complex values of both the variable and index. The functions of an imaginary variable were required in physical investigations over a hundred years ago, the use of Bessel functions of a complex quantity is almost as old, as it began with work on the motion of a pendulum in a resisting medium. These functions were given a special notation by Lord Kelvin and were much used by electrical engineers

[1] H. A. Edgerton and S. H. Britt, *American Scientist*, 31: 255–262, 1943.

[2] Banesh Hoffman, *American Scientist*, 31: 255, 262, 1943.

[3] H. A. Edgerton and S. H. Britt, *American Scientist*, 31: 263–265, 1943.

[4] Paul F. Brandwein, *Science Education*, 28: 47–49, 1944.

[5] H. A. Edgerton, S. H. Britt and H. M. Davis, *Science Education*, 28: 229, 1944.