of decaying wood and some is light enough to float on water. A loss of 36 per cent. of the mine wet weight and considerable shrinkage in volume was found after drying a sample on the water bath. Especially when wet it readily stains the hands, this possibly giving rise to the name.

The soot is found in elongated, flattened to cylindrical masses, not limited to any portion but most frequently found in the upper part of the coal. The shape of the inclusions suggested vegetation that had resisted alteration, but the lack of contact markings or of definite structure discouraged such a conclusion.

While sometimes in contact with bright coal, the inclusions are usually surrounded with a bony or pyritiferous material. The study so far made suggests the contained pyrite (and surrounding pyrite when present) as responsible for the soot. As particles of unaltered coal occur mingled with pyritic matter in the soft organic mass, it seems probable that the original coal has been altered to this condition by the presence of the pyrite and circulating ground water, which have destroyed the structure and changed the physical characters of the coal. The change might be brought about in part by physical shattering of the coal as the included pyrite was altered, as well as by chemical action. In several ways the soot behaves like the adjacent unaltered coal, including its manner of coking under the blowpipe flame. Unlike the action on coal, the action of nitric acid on either the raw soot or on the washed gritty residue is strikingly vigorous. This is believed to be due to either the finely divided or disintegrated state of the pyrite.

Samples were shown to Mr. David Reger of the State Survey, who states that he has noted occurrences of similar nature in several coals found in West Virginia, but has made no special study of them. Dr. I. C. White, head of the survey, kindly offered the services of the survey chemist, Mr. B. B. Kaplan, in making an analysis. The report of this analysis, just received, tends to confirm the writer's conclusions. The following results were obtained for the "darker" specimen "which analyzes as though it were a crushed bituminous coal":

Moisture	17.15 per cent.
Volatile matter	39.74 per cent.
Fixed carbon	30.31 per cent.
Ash	12.80 per cent.

No quantitative analysis for sulfur or iron was made, but attention was called to the probably high content of each. "The brown variety behaves more like a crushed coal that has been exposed." This statement would suggest that the disintegrating chemical action had proceeded farther in the case of the lighter color.

The readiness with which most of the pyritic matter settled out of the mass when washed with water may imply that it is foreign and probably feasible to reduce in unaltered coal by modern crushing and washing methods when its content becomes too high.

The amount of "soot" in this mine is too small to have any economic significance, but the occurrence seems sufficiently interesting to warrant some discussion as to its presence in other localities.

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WEAK LEGS IN CHICKENS

DURING the past few years a number of investigators have attempted to use young chicks as experimental animals in the study of nutrition problems. Some have reported favorable results while others have been unable to grow normal chicks in confinement even when feeds were used that had proved to be adequate for rats and other experimental animals. The chicks usually developed a condition known as "weak legs" which is characterized primarily by improper bone development and the failure to develop secondary sexual characteristics.

Experiments which we are now conducting show this condition to be identical with rickets in mammals. The lesions are the same and the conditions under which it is produced are the same as those which cause rickets.

These experiments show that young chicks receiving a standard scratch feed and mash supplemented with sprouted oats and fresh buttermilk will develop rickets (weak legs) if they are kept in a room where the light is filtered through glass, while chickens receiving the same treatment but exposed to direct sunlight a few hours each day will develop normally. Ultraviolet light was found to have the same beneficial effect as sunlight. It was also found that cod liver oil, which has been shown to contain a substance which will prevent rickets in mammals, would prevent this condition in chickens.

A complete report of this experimental work will appear in *Poultry Science* in the near future.

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NITROGEN LOSSES FROM COMPOSTS

THE loss of nitrogen from compost and manure heaps is the avenue for waste of the greater part of this element in feeds. Even under most careful handling this waste is not readily controlled, because while mechanical safeguards against leaching, etc., may be employed, there still remains the considerable loss through the atmosphere due to biological agencies.

The value of nitrogen fertilizers in fixing the or-

ganic matter of manure, and the desirability of incorporating highly nitrogenous materials in composts add to the importance of preventing any loss of the element.

In a series of compost mixtures prepared and stored in the greenhouse it was found that loss of nitrogen to the atmosphere was prevented when powdered sulfur was included in the mixture at the rate of two pounds sulfur per hundred pounds of the mixture (dry basis).

A compost of six parts Florida soft phosphate, three parts dry soil, two parts cottonseed meal and one part dried stable manure, when kept at optimum moisture content for seven months in glass jars lightly covered, had lost, principally through ammonification, 60 per cent. of the original total nitrogen present. Ammonia nitrogen varied irregularly from the original 0.075 per cent. to 0.149 per cent. at the end of seven months. A sample obtained after six months and analyzed without drying showed a loss of 32.8 per cent. of the original nitrogen. After carefully drying this sample at low temperature the nitrogen content was further reduced from 1.193 per cent. to 0.809 per cent. (dry basis). The ammonia nitrogen of the moist sample was 0.346 per cent. and in the sample after drying showed 0.134 per cent.; ammonification proceeded rapidly during the first stages of drying.

When sulfur was included in the compost at the rate of two pounds per hundred of mixture the original nitrogen content was 1.535 per cent., and after seven months it was found as 1.567 per cent. In this mixture the ammonia nitrogen had increased regularly from 0.065 per cent. in the initial sampling to 0.767 per cent. in the ninth and final sampling, indicating that the conserving action of the added material was due to sulfofication rather than to the retarding of ammonification.

The practical significance of course is in the possibility of checking the enormous losses of a valuable form of nitrogen by a simple expedient.

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SCIENTIFIC BOOKS

External Insect Anatomy. A Guide to the Study of Insect Anatomy and an Introduction to Systematic Entomology. By ALEX D. MACGILLIVRAY. Scarab Co., Urbana, Ill. 1923. X + 388 pp.

THIS text, which, in the words of the author, has been prepared to meet "the needs of students," deals wholly with descriptive, external anatomy of insects.

The introductory chapter opens with a brief historical account, followed by a synopsis of the Hexapod orders, a section on the technical nomenclature of orientation, and a section of miscellaneous definitions. Chapter two treats of the fixed parts of the head, twelve pages being devoted to a general discussion of the vertex, front, ocelli, clypeus, labrum, occiput and other parts of the head structure. Then come detailed descriptions of external features of the heads and tentoria of twelve representative species of the principal orders. The movable parts of the head are considered in the 82 pages of Chapter 3. This part is divided into eight sections dealing with the compound eyes, antennae, mandibles, maxillae, labium, the Hymenopterous maxillae and labia, the pharynx and Dipterous mouth parts. Under each section the general features of the appendages are first explained, after which detailed descriptions are given of these parts in a number of insects.

In Chapters 4 and 5, which deal with the external structure of thorax and abdomen, respectively, there follows, after a preliminary account, descriptions of the thoracic and abdominal sclerites and abdominal appendages of a few species belonging to the orders Orthoptera and Coleoptera, and in the case of the abdomen, of the Lepidoptera and Diptera also. The legs and the wings are minutely described in Chapters 6 and 7. The Comstock-Needham system of naming the wing veins is closely followed. Of the 142 text figures, all but eleven are of the wing venation. The concluding pages of the book are devoted to a list of the species described and to an index of 20 pages with accented and syllabicated technical terms.

Though intended by the author as a text-book for students' use, to the reviewer it seems that its greatest field of usefulness will be to systematists and teachers of insect morphology, for, as the author says, "a thorough knowledge of the external anatomy of insects is fundamental to their taxonomy." There is no gainsaying the statement that a uniform terminology covering all insect orders for the sclerites and appendages of the body is highly desirable. With increasing activity in systematic entomology and the discovery of new taxonomic characters the need for a more extensive, but at the same time uniform, terminology, is felt. In this book there is rendered accessible to the entomologist for the first time in many years an account in English on the comparative external anatomy of insects, with clear-cut definitions and many illustrative examples. The attempt to reconcile the systems of nomenclature of the morphologist and of the systematist is most praiseworthy.

Whether the book will be accepted as a text by many teachers of entomology remains to be seen. If adopted, the teacher must of necessity make a judicious selection of the material as there is much