

busia has been introduced, not only into southern Europe, but also into Palestine, the Philippine Islands (from whence it is reported to have reached China and Japan), the Hawaiian Islands, the West Indies and the Argentine.

Gambusia apparently did not multiply as rapidly or become as numerous in other localities where it was introduced as it did in Italy. However, it generally multiplied and spread. In Palestine alone it appears to have met enemies with which it could not cope successfully. Often Gambusia spread far and wide from the place of introduction, as already indicated, until it has become almost cosmopolitan in the warmer sections of the world.

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THE COMMON EARTHWORM AS A SERIOUS ECONOMIC PROBLEM

ORDINARILY the common earthworm is thought of as being a valuable adjunct to the fertility of the soil. Under ordinary conditions this is generally true. However, a condition has come to my notice in which just the reverse is the case.

A few weeks ago a rancher from one of the lower mountain valleys came into my office with the following story. From the main canal, a ditch about a mile and a third in length leads to his ranch. This supply ditch skirts the base of a hill which is largely clothed with scrub oak. Consequently, conditions bordering the ditch are ideal for earthworms, because the soil contains large quantities of humus. Organic matter is abundant.

The whole problem is that the soil bordering the ditch is so riddled with the burrows of earthworms that it is almost impossible to get water through the ditch with which to irrigate the fields of the ranch. The soil bordering the ditch is so porous that the greater part of the water seeps away and is lost. This is a serious condition; and, in years of a scarcity of water, it becomes doubly serious. The rancher was seeking a remedy, for his ranch threatened to become valueless as a result of this condition.

So far as the writer is aware this problem is unique. No precedent was available upon which to base a definite answer to the rancher. However, it was suggested that the ditch be shut down and copper sulphate be used to poison the worms. Copper sulphate can be dropped, a handful about every three or four feet in the standing water in the ditch. When the water shall have all soaked into the soil, the ditch could be opened up again.

If the worms are to be poisoned they must be poisoned by a method that will be harmless to live-stock, since live-stock use the water of the ditch for

drinking purposes. It seems that the copper sulphate method is the least likely to be dangerous. Some work done by the writer in former years¹ seems to indicate that this chemical, over a short period of time, will result in no harm to vertebrates.

In the West, in virgin desert soil, so far as the writer is able to determine, earthworms do not occur. They become established only when dry land is brought under irrigation. In some sections of the West, if not most sections, irrigation has not been practiced for very long, comparatively speaking. Consequently, earthworms are just now beginning to be present in really considerable numbers. In fields and pastures generally they are valuable adjuncts to the fertility of the soil; but, in situations such as the above described, they may be a serious pest. In the future they may become more of a pest and a source of serious economic loss. However, it is believed that copper sulphate, a cheap chemical, may be the solution to such problems.

Another solution would be to concrete the supply ditch; but this is an expensive proposition. To build a wooden flume would also be expensive. As a temporary measure, the rancher in question used tarred roofing paper, folded into the ditch, as a relief measure. This latter worked, but it is obviously only a purely temporary way to solve the problem.

The writer has in his own flower garden a short row of sweet peas that it is impossible to water with the hose from the city water supply, when the hose is allowed to run a fair stream with the nozzle placed in a tin tomato can at the head of the row. This is due to the burrows of earthworms draining away all the water. Consequently all watering of these flowers is now done by surface sprinkling.

Water is all-important in the West. Those that are well informed know the careful attention that is given to reclamation and to conservation of the water supply in the western United States. Any waste of water is serious, and a direct economic issue. With regard to the problem as above stated, further research is to be undertaken by this laboratory and it is hoped that a solution may be reached.

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CONICAL HAILSTONES

Two interesting descriptions of conical snowflakes have recently appeared in *SCIENCE*¹, one by Mr. A. D. Moore and one by Mr. W. W. Wagener. It is never easy for an author to feel sure that he has examined all the literature, and it may therefore be worth while to call attention to two papers on a similar subject

¹ C. T. Hurst, "The Effects of Solutions of Copper Sulphate on Ducks," *Arch. Path. and Lab. Med.*, 1926.

² A. D. Moore, *SCIENCE*, 73: 642 (June 12, 1931). Willis W. Wagener, *SCIENCE*, 74: 414 (October 23, 1931).

written between fifty and sixty years ago by Osborne Reynolds².

The papers by Reynolds deal with the manner in which raindrops, snowflakes and hailstones are formed. Concerning the shape of a hailstone he says: "Although to the casual observer hailstones may appear to have no particular shape except that of more or less imperfect spheres, on closer inspection they are seen all to partake more or less of a conical form with a rounded base like a sector of a sphere. In texture they have the appearance of an aggregation of minute particles of ice fitting closely together, but without any crystallization such as that seen in the snowflake—although the surface of the cone is striated, the striae radiating from the vertex." This description is similar to those given by Mr. Moore and Mr. Wagener for the snowflakes which they observed.

Reynolds made some experimental studies in which he obtained imitation hailstones of this shape, but in connection with real hailstones he says: "When found on the ground the hailstones are generally imperfect." Perhaps this imperfection is one reason why the conical form is not observed more frequently.

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THE SCHOOL DAYS OF LORENTZ

I AM not sure how generally known it is among scientists in this country that on September 9 last a monument to Hendrik Antoon Lorentz was unveiled in the Sonsbeekpark in Arnhem by Princess Juliana of the Netherlands. In connection with this event, one of Lorentz's early school friends published in the *Haagsche Post* for September 5 some recollections of many years ago. Thinking that a good many readers of *SCIENCE* may be interested in anecdotes concerning Lorentz, I am sending herewith a free translation of some of the stories told in this article.

I made the acquaintance of Lorentz in the days when the boiling of a kettle of water in the early morning hours was troublesome for the housewife; it could be bought for a penny and a half in one of the neighboring shops.

Soon after I had come to live in the street where Lorentz's father kept a grocery, each of us was sent to fetch hot water. As customary among boys who meet for the first time, we had to make acquaintance by means of a fight; and I was quite ready for a good working out, but did not get that far. Even in his early years Hentje Lorentz was of a peace-loving nature; besides he showed his powers for logical thinking. I can still hear him say, "Don't you think we had better postpone the fight until another time? Fighting is dangerous when

you are carrying a kettle of boiling water; for burns leave permanent scars." I had lost my desire to fight and we walked home the best possible friends.

From a later period: One of the three teachers in our school used to lecture occasionally on scientific subjects. For these lectures he needed drawings. Drawing was my one accomplishment. The strange thing happened that I was frequently punished a few days before a lecture was to take place. The punishment consisted of having to draw physical apparatus with white chalk on blue paper. One day there was apparently so much work to be done that one boy could not get it completed in time. To the great astonishment and indignation of the entire school, Lorentz was also punished on that day; no one knew why. So that afternoon, Hentje and I sat bent over large sheets of blue paper. During our work he explained to me the principles underlying the various instruments that we had to draw. To him everything was as clear as crystal; I did not understand much about it and did not know where he got all the information, thinking at first that he was fooling me. All of a sudden our teacher came in, probably having heard a good part of the lecture Lorentz had given me; for he patted him on the back and said: "What brains! There is not very much I can teach you about this subject any more." Among the boys of our acquaintance it was the common conviction that Lorentz knew everything.

From his early manhood: One day I nearly burst with laughing for I met Hentje wearing a full, black beard; he was then nineteen years old. When I expressed my astonishment at this remarkable adornment of his chin, he answered, "I have been appointed teacher in one of the evening schools: this beard will support my prestige." His good-hearted, intelligent eyes showed the same twinkle that always characterized him in boyhood.

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THE WORK OF DR. BASKERVILLE

IN the issue of *SCIENCE* for October 30, Dr. Carmichael is credited (p. 422) with the following statement concerning the work of the late Dr. Charles Baskerville: "He discovered the chemical elements, carolinium and berzelium."

This is obviously a slip, as no such elements are recognized by chemists. Dr. Baskerville, with whom I had the honor to be associated for four years, did tentatively announce the discovery of substances which he designated as carolinium and berzelium. The announcement was premature, and I am certain that he regretted it. The literature records many similar occurrences, and this does not in any way detract from the high opinion which Dr. Carmichael holds concerning Dr. Baskerville, who was not only a brilliant research chemist but a man whose kindness and stimulating personality endeared him to his colleagues.

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² Osborne Reynolds, *Lit. and Phil. Soc. Manchester, Memoirs*, Vol. 6 (1876-77 and 1877-78). Reprinted in the *Scientific Papers of Osborne Reynolds*, Vol. 1: 214, 223.