brown longitudinal foliar stripes and withering of leaves. It occurs also as a saprophyte or weak parasite on *Phleum pratense* L., *Dactylis glomerata* L., *Sorghum vulgare* Pers., *Agropyron cristatum* (L.) Gaertn., *Setaria viridis* (L.) Beauv., *Hordeum vulgare* L., *Paspalum notatum* Flügge, *Chloris Gayana* Kunth, and *Soja Max* (L.) Piper. It has been isolated from oats grown in 19 states, from Idaho to Texas eastward, in 1945 and 1946, and from the other-named hosts in and around Ames, Iowa, from 1942 to 1946. A collection of *A. sativa* var. Boone, made by the senior author at the Agronomy Farm, Iowa Agricultural Experiment Station, Ames, on 25 July 1946 is designated as the type (U. S. Department of Agriculture, Mycological Collections No. 71483). Portions of the type collection have been deposited in the Mycological Collections of the Bureau of Plant Industry, Beltsville, Maryland; in the herbarium of the Botany Department, Iowa State College, Ames; and in the Farlow Herbarium, Harvard University, Cambridge, Massachusetts.

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Maintenance of Penicillin Blood Levels After a Single Intramuscular Injection of Penicillin in Various Oils

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This is a preliminary report on a study being made to determine the most satisfactory diluent for penicillin from the standpoint of maintaining a blood level of 0.1 unit/ml. over a period of 24 hours after a single intramuscular injection.

The diluents tested were peanut oil, cottonseed oil, soybean oil, hydrogenated peanut oils (melting points, 40° C. and 50° C.), hydrogenated soybean oil (melting point, 40° C.), and a commercially prepared mixture in which the penicillin was suspended in peanut oil and 4.8 per cent beeswax[1] from two pharmaceutical companies. The penicillin was mixed with each diluent in the amount of 300,000 units/ml. The doses injected were 300,000 units (1 ml.), 1,000,000 units (3.3 ml.), 1,500,000 units (5 ml.), and 2,000,000 units (6.7 ml.), the majority of doses being 1,000,000 units. So far, 254 injections of penicillin in various oils have been given to 36 ambulatory patients, all but two of whom were syphilitics.

Penicillin blood levels have been determined by the Hobby method (*2*) and checked by a modification of the Kirby-Rantz method (*3*). The streptococcal inhibiting factor in human sera, as described by Elias (*1*), was tested for in some 10 patients, and of all the specimens assayed, none showed a streptococcal inhibiting factor.

It should be emphasized that there has been a remarkable variability in blood levels taken at stated times from different patients receiving the same dose at the same intervals. This variability has been noted by other workers in similar studies.

In cases treated to date we can state that hydrogenated oils delayed the absorption of penicillin more than the plain oils.

A prolonged high level was observed most frequently after the use of either hydrogenated cottonseed oil (melting point, 40° C.) or the penicillin-beeswax-peanut oil mixture when tested following a 300,000-unit or a 1,000,000-unit dose of penicillin.

A dose of 300,000 units of penicillin in hydrogenated cottonseed oil maintained a 0.1 unit/ml. penicillin level for at least 6 hours in about 80 per cent of the cases, while in the beeswax-peanut oil mixture it maintained that level in 66 per cent of the cases. Twelve hours after injection of 300,000 units in hydrogenated cottonseed oil only about 16 per cent of the cases had a 0.1 unit/ml. penicillin level, while the beeswax-peanut oil mixture had no 0.1 unit/ml. levels. In a 1,000,000-unit dose these two preparations gave a 24-hour penicillin blood level of at least 0.1 unit/ml. in 38 and 40 per cent of the cases, respectively, as well as producing higher penicillin blood levels at the 6- and 12-hour intervals after injection. In general, our results from either of these preparations have been very similar, although from our experience with the extemporaneous preparation of a suspension of penicillin in hydrogenated cottonseed oil it has seemed to have a practical advantage over the penicillin-beeswax-peanut oil mixture in that it melted considerably more rapidly under a hot-water tap, was less viscid at any given temperature, and stayed liquid longer after having been heated.

At this early date we can make no statement regarding the therapeutic value of daily injections of either preparation in the treatment of syphilis, except to say that the serological results so far have been encouraging. The follow-up period has been sufficiently long for 6 out of 19 seropositive primary and secondary syphilitics to have given negative serological tests in an average of 60 days.

Summary. Experiments with various oily diluents for penicillin indicated that of the oils tested, peanut oil with 4.8 per cent beeswax, and hydrogenated cot-

[1] As advocated by Romansky and Rittman (*Science*, 1944, **100**, 196).

tonseed oil (melting point, 40° C.), produced the most satisfactory prolongation of the absorption of intramuscularly injected penicillin.

Increasing the dosage of the individual injection not only heightened the penicillin blood levels at any given hour after the injection but also increased the duration of the retention of penicillin in the blood.

It seems probable that a dosage of 1,500,000 units of a very finely ground calcium penicillin of high potency suspended in hydrogenated cottonseed oil (melting point, 40° C.), which can be made fluid under a hot-water tap and dispersed in a disposable syringe, would maintain a penicillin blood level of 0.1 unit/ml. for 24 hours or longer in nearly all cases.

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The Chloride Content of Conifers

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According to two widely used textbooks (*1, 6*), the element, chlorine, is absent in coniferous plants. This erroneous statement apparently is based on a mistaken interpretation of the results of an extensive microchemical survey by Jung (*5*), who used the following reagents for the detection of chlorides in plant sections: (a) 0.5 gram of thallous acetate and 2 grams of glycerol in 7.5 grams of water; (b) 0.1 gram of silver nitrate in 9.9 grams of 10 per cent ammonia solution. The first reagent gave more characteristic crystals than the latter, but was much less sensitive to small amounts of chlorides. He examined qualitatively 604 species of plants from 389 genera, representing 137 families. In 5 of 18 species of conifers tested, chlorides were present in traces. Other species were consistently negative in their reaction, so that the conifers were included in a class of plants designated as "salt-shunning."

Thus, Jung's data on the chlorides of conifers contradict the textbook generalizations. In addition, the following quantitative chemical analyses show that many conifers contain chlorides:

Wolff's tabulations (*9*) show chloride analyses for *Pinus Laricio austriaca* (=*P. nigra austriaca*) and for *P. Abies* (*Abies excelsa*) (=*Picea Abies*). Robinson, Steinkoenig, and Miller (*7*) found the following percentages of chlorides (dry-weight basis): shortleaf pine (*P. echinata*) needles, 0.11; stems, 0.05; longleaf pine (*P. palustris*) needles, 0.13; stem, 0.09. Harris and collaborators (*2*) measured the chloride content, reported as grams per liter, of the expressed saps of the following conifers: *P. flexilis*, 0.4; *Pseudotsuga mucronata* (=*P. taxifolia*), 0.7; *Juniperus utahensis*, 0.2–1.5. Wherry (*8*) has reported analyses for chlorides in the pitch pine (*P. rigida*). According to a personal communication, the greater part of the samples consisted of needles, with the inclusion of not more than 3–4 cm. of stem. A sample of pitch pine from a Coastal Plain woods in New Jersey contained 0.67 per cent chlorides in the ash, equivalent to 0.02 per cent fresh weight. The corresponding figures for a sample from a serpentine-barren soil in Pennsylvania were 1.44 and 0.03 per cent. Jessen (*4*) fertilized larch (*Larix europaea*), spruce (*Picea Abies*), and pine (*P. sylvestris*) plants with increasing amounts of KCl in one series and of K_2SO_4 in another series. In sand cultures marked injury resulted as the chloride content of the fertilizer was increased; chloride injury was much less evident in the forest-soil series. No injury was noted in the K_2SO_4 series except to one-year spruce transplants. To illustrate some of the figures for the chloride content (based on the dry weight of the whole plant) one-year-old unfertilized spruce trees (sand culture) contained 0.37 per cent Cl; fertilized with the maximum addition of KCl, the percentage increased to 2.09, as compared with a figure of 0.34 per cent Cl for the maximum addition of K_2SO_4. In limed forest-soil cultures, the chloride content of unfertilized spruce seedlings varied from 0.12 to 0.17 per cent; when the maximum amount of KCl was added, the chloride content increased to 0.36–0.38 per cent.

TABLE 1

Chloride Content of Healthy Shortleaf Pine Needles and of Needles in Different Stages of "Little-Leaf" Disease

Needles	Per cent chlorides (dry weight)	Average chloride content per needle (μg.)	Average dry weight of needles (mg.)
Healthy	0.069 (40)*	16.4 (25)	22.5 (25)
Diseased	.119 (28)	11.3 (15)	11.6 (13)
Difference	.05	5.1	10.9
Standard error of difference	.0106	1.885	1.441
P	<0.001	~ 0.01	< 0.001

* The numbers in parentheses represent the number of samples measured.

In connection with the problems of "little-leaf" disease in *P. echinata* (*3*), the present authors have analyzed 68 samples of needles for chlorides. These samples were collected from 15 different localities in six southern states. The needles were taken in 1942 from the middle of the crown of the trees from growth