mainly around Cape San Lucas. Since that date, Dr. William Beebe has found them almost abundant and almost tame in those same waters. And more recently (1938), I have recorded that whale sharks are so abundant on the outer coast of Lower California from Hippolito Point to Cape San Lucas and so entirely unafraid as to be almost a nuisance to the tuna fishermen.[2]

From the Central Pacific but two whale sharks have ever been reported so far as I know—and these interestingly enough from the same group of islands. In 1929, Rougier[3] described a *Rhineodon* skin in the little museum in Papeete, Tahiti. This had come from a 17.3-foot specimen taken at Takaroa, Tuamotu Archipelago, in 1928. The second record is one I made in 1937 of a whale shark about 40 feet long impaled on the bow of a steamer near Tikehau Atoll in the Tuamotus.[4]

To these two records, I am now fortunate in being able to add a specimen of the whale shark, found in Hawaiian waters. These data came to me through the courtesy of Captain G. S. Bryan, hydrographer, U. S. Navy Department. This is but the last of many accounts of the wide-spread occurrence of this great fish communicated by the Hydrographic Office—to which my debt is heavy. This excellent account, sent in by Second Officer R. C. Willson, of the S. S. *Mapele* of the Matson Navigation Company, San Francisco, has been forwarded to me, and from it the following data on coloration and behavior are put on record.

On September 4, 1938, the *Mapele* was moored off Kukuihaele Landing on the north coast of Hawaii in Lat. 20° 08′ N. and Long. 155° 33.5 E. At 2:30 P.M. local time, a whale shark was seen slowly and fearlessly swimming around the ship among the sweepings and larger debris thrown overboard. The shark, seen by all hands, was about 25 feet long and about 4 feet wide across the broad blunt head. The description of the markings indubitably identify this fish as a whale shark. The head was covered with many white spots varying from one to two inches in diameter. These were scattered in random fashion over head and neck region. On the other hand, the body was covered with white spots in vertical rows separated by vertical white stripes. These extended from the back down the sides as far as the curve of the belly permitted sight. The rows of spots were about 6 inches apart, and the white stripes were about 2 inches wide. Spots and stripes both decreased in size from above downward and from the neck region toward the tail. The dorsal fin was about 18 inches high and had on it 7 distinct spots.

At about 3:30 the shark disappeared, but at 6:00 P.M. it was again seen swimming about under the stern amid slops and scraps thrown overboard from the ship's galley. "It swam leisurely around for about 20 minutes, bumping into the mooring lines a number of times. Once as it was swimming over one of the lines to a buoy the ship lifted, throwing the shark partly out of the water. Then it swam slowly off toward the west and was seen no more."

This behavior tallies almost exactly with the actions of another whale shark in swimming around a steamer in the harbor of St. Marc, Haiti, in 1937.[5] It is also very like that described of various specimens off the outer coast of Lower California. This great fish has no enemies and seems entirely unafraid of vessels and of men.

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TOXICITY OF THE SODIUM SALT OF DINITRO-o-CRESOL TO VENTURIA INAEQUALIS

POSSIBILITIES of direct chemical attack on fungi that cause certain types of plant disease now combated chiefly by repeated applications of protectant fungicides have been studied by the writer and associates.[1] It is sought by an eradicant fungicidal treatment at a vulnerable stage in the life-history of the pathogen to reduce the primary inoculum to a level at which the disease may be more surely and economically controlled. A preliminary report on further experiments with the apple scab pathogen, *Venturia inaequalis* (Cke.) Wint., follows.

In small-scale experiments in the spring of 1938, overwintered apple leaves bearing abundant mature ascocarps of *V. inaequalis* were sprayed with Elgetol, a proprietary preparation containing 12 per cent. by weight of the sodium salt of dinitro-o-cresol with a supplement to aid its penetration. Similar leaves sprayed with water served as controls. Studies of treated and untreated leaves indicated that Elgetol in water at 1 per cent. by volume reduced ascospore discharge by 99.7 per cent. (average of 3 trials).

Toximetric studies with agar plate cultures by a method reported by Palmiter and Keitt[2] indicate that the lethal concentration of Elgetol to the 2 isolates of *V. inaequalis* tested was near .05 per cent. by volume.

These small-scale experiments show that Elgetol has a high degree of eradicant effectiveness against *V. inaequalis*. Conclusions regarding its practical adap-

[2] E. W. Gudger, *Calif. Fish and Game*, 24: 420–421, 1938.

[3] Emm. Rougier, *Bull. Soc. Etudes Oceanogr.*, Papeete, 3: 318–319.

[4] E. W. Gudger, SCIENCE, 85: 2204, 314, 1937.

[5] E. W. Gudger, *Copeia*, 1: 60, 1937.

[1] G. W. Keitt and D. H. Palmiter, *Jour. Agr. Res.*, 55: 397–438, 1937.

[2] D. H. Palmiter and G. W. Keitt, *Jour. Agr. Res.*, 55: 439–452, 1937.

tation for apple scab control must await the results of further experiments, which are in progress.

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SEEDS FOR THE STUDY OF ROOT AND ROOT-HAIR STRUCTURE IN BOTANICAL LABORATORIES

IN connection with studies made of the invasion of the bunch grass prairies by weeds, extensive germinations were made with *Bromus tectorum* L., one of the most common and abundant weeds invading deteriorated prairies in western Montana.

Under ordinary laboratory conditions, *B. tectorum* germinates easily in two days, giving usually from 90 to 98 per cent. germination. Its very fine single seminal root appears to me a most excellent material for the study of root-hair structure in undergraduate laboratories. All zones of the young primary root can be easily seen under both low and high powers of the microscope. The root-hairs stand out very clearly and prominently, giving a full series from the youngest epidermal cell just bulging out to the fully developed hair, in which streaming of protoplasm is usually evident.

A very convenient way, without the use of blotters, is to scatter the seed in the moist chamber, in which water has been poured to a depth of say one half to one mm. The chamber may be placed either in a lighted or in a darkened place; in two or three days the roots will be of the proper length. The seeds will also germinate if dropped in a tumbler-full of water.

I'll be glad to send on the receipt of a mailed and stamped envelope enough seed for any size class.

JOSEPH KRAMER

MONTANA STATE UNIVERSITY

SPECIAL ARTICLES

ACTION OF KETENE ON THE PITUITARY LACTOGENIC HORMONE

IN their study of the acetylation of pepsin, Herriott and Northrop[1] found that the primary amino groups play no significant role in the activity of the pepsin molecule. Later, White[2, 3] reached the same conclusion in a study of insulin and emphasized the importance of the tyrosine molecule in all hormones of protein nature. In contrast with their conclusions we have found that the primary amino groups in the lactogenic hormone appear to be important for its biological activity.

The lactogenic hormone contains 0.53 per cent. amino nitrogen, as determined by Van Slyke gasometric apparatus. Herriott and Northrop have shown that amino groups are acetylated by ketene at room temperature in not more than five minutes, whereas the phenolic hydroxyl groups remain unchanged.[4] We have also found that ketene treatment for five minutes at room temperature was sufficient to block all amino groups in the lactogenic hormone. If the reaction is carried out at 0° C, for five minutes, only 30 per cent. of the amino groups is acetylated. The acetylation is achieved by passing a constant stream of ketene into a suspension which contains 10 mg protein per cc in pH 5.6 M acetate buffer. Ketene is obtained by the improved type of generator designed by one of us.[5]

All ketene experiments were done with a preparation of lactogenic hormone (Li-P)[6] which, as Table I shows, gives a pronounced reaction when a total dose of 1 mg is injected intramuscularly into one-month-old squabs.

It will be seen from the results in Table I that the free amino groups in lactogenic hormone are essential for its activity. The results of the present work are in contrast with those secured by Stern and White[7] in the acetylation of insulin, and are especially interesting because of several striking similarities in the two hormones. Stern and White treated insulin with the same reagent—ketene—under conditions similar to those here employed, and found that the free amino groups of insulin played no significant role in its phar-

TABLE I

Lactogenic preparation (Li-P)	Amino groups acetylated per cent.	Dose/ Squab mg	Number of squabs	Crop sac reactions
Untreated	0	1.0	3	pronounced
Acetylated at 0° for 5 minutes	30	1.0	3	2 minimal 1 negative
Acetylated at 20° for 5 minutes ...	100	1.0	6	negative
	100	4.0	6	negative

[1] R. M. Herriott and J. H. Northrop, *Jour. Gen. Physiol.*, 18: 35, 1934–35.

[2] K. G. Stern and A. White, *Jour. Biol. Chem.*, 122: 371, 1938.

[3] A. White, Cold Spring Harbor Symposia on Quantitative Biology, 6: 262, 1938.

[4] There is as yet no experimental evidence to show that the phenolic hydroxyl of tyrosine in the lactogenic hormone is also important for its biological activity.

[5] C. H. Li, SCIENCE, this issue, page 143.

[6] The authors are most grateful to Dr. W. R. Lyons for the potent preparation of lactogenic hormone employed. The minimal effective dose was 0.2 mg when divided into four daily doses and administered intramuscularly. We have had the opportunity of studying a similarly potent preparation of adrenotropic hormone, due to the kindness of W. R. Lyons and H. D. Moon. The activity of adrenotropic hormone is not destroyed by ketene by five minutes of treatment. This method may conveniently eliminate the lactogenic activity in adrenotropic fractions.

[7] *Loc. cit.*