Swan Lake Research and Flora of Jackson Hole Area

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University of Wyoming
Projects Number 75 and 81

1. Study of the vegetation of Swan Lake
   a. Phytoplankton
   b. Algae of the shoreline and attached to water plants
   c. The aquatic plants of the shoreline

2. Study of the vegetation of Grand Teton National Park and vicinity
   a. Collection of plants for the check collection at the Station with duplicates for the Park
   b. Identification of plants for other research workers and interested individuals

3. Study of the fungi of Grand Teton National Park and vicinity
   a. Collection of and note taking on the fleshy fungi of the area. These are then sent to Dr. Alexander H. Smith of the University of Michigan for further critical study.
   b. Collection of the parasitic fungi of the area. These are later studied by the undersigned and will eventually lead to publications on the material. The study is of a survey nature as little information is available on the fungi of the area.

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Influence of Nerves on the Regeneration and Regression of Limbs in Amphibia

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Project Number 68

The problem is to discover how amphibians are able to replace lost structures, such as limbs and tails, by regenerating new ones. Past work by a host of biologists has demonstrated the great importance of nerves in controlling regeneration. Thus, if one reduces by extirpation the number of nerves entering a limb to a third of the normal number, then subsequent amputation is not followed by regeneration. The adult frog is unable to regenerate a limb after amputation. Nevertheless, when the hindlimb nerves are added, by appropriate deviation, to the forelimb so that the latter will possess the innervation of two limbs, subsequent amputation of this treated frog limb results in regeneration. Thus, we know that the quantity of nerves supplying a limb is of vital importance for its regeneration, but we still do not know how these nerves produce the essential stimulus for regeneration.

My own studies of regeneration have uncovered a possible clue to the activities of nerves in regeneration. Thus, after the amputation of a limb there forms a wound epithelium which quickly becomes innervated by tiny nerve twigs which have regenerated from the cut nerve stumps in the limb. The wound epithelium thus innervated rapidly proliferates and forms a thickened mound or cap over the wound surface. Under this epidermal cap there accumulates a mass of mesenchyme cells out of which the new limb will differentiate. It looks as though this epidermal cap were stimulated to form by some stimulus given off by the nerve twigs invading it. Once formed the cap seems to attract the regeneration cells. Experiments conducted at the Research Station, in which the cap was removed, demonstrate that limb regeneration can be prevented by the simple absence of the cap. Furthermore, when head or body skin is transplanted to the limb and subsequent amputation made through the skin graft, regeneration does not occur. Such grafted skin seems to form a heavy scar tissue which prevents the formation of an epidermal cap and thus inhibits the first step in regeneration. Possibly human scar tissue has similar inhibiting properties, slowing wound healing and preventing organ regeneration.

The tiger salamander of the Jackson Hole area has proven to be a very fine experimental animal for regeneration studies and is now in demand from several research laboratories. There is no substitute, however, for working with fresh specimens right in their own habitat. It is for this reason that I travel from Ohio each summer to Jackson Hole. To be sure there are tiger salamanders throughout the Rocky Mountain area, but the Jackson Hole Biological Research Station is the only laboratory in the whole Rocky Mountain area that has facilities which make it possible to conduct experimental work on this salamander.

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