LIFE-HISTORY OF RHYTISMA ACERINUM (PRELIMINARY ACCOUNT).—The needle-shaped ascospores of *Rhytisma acerinum* are one-celled, uninucleate, and furnished with a massive sheath. From experiments carried out in the laboratory the spores conveyed by air currents appear to fall exclusively on the upper leaf surface. They readily germinate in a weak decoction of prunes, first becoming septate into two, rarely three, cells. The germ-tube almost invariably arises in a lateral position from the blunted half. The mycelium is exceedingly fine, the nuclei being very minute; it develops rapidly within the upper epidermal cells, completely filling up the latter. Infected areas first appear as yellow patches which very early begin to blacken at the centre; these areas form stromata which first give rise to pycnidia. Increased development of the mycelium in the epidermal cells of specified areas in the stroma causes these cells to split in half tangentially, the upper half forming a dome-shaped roof and the lower remaining as the floor of the future pycnidium. Here the mycelium gives rise to simple conidiophores which abstrict small, uninucleate conidia in enormous numbers. The conidia appear at the ostiole of the pycnidium in a viscid exudate; their function is not known. After the disappearance in late summer of the conidia the persistent conidiophores either become con crescent and blackened or, if the pycnidium is to be converted into an apothecium, they are raised up by growth of the cells below them and become a part of the future apothecial roof. Usually, however, apothecia arise *de novo* at the margin of the stroma, in which case the roof is formed by the addition of cells abstricted from the mycelium below. When the process of roof thickening is over there is an appreciable space for further development. Among the apothecial cells there now appear cells conspicuous by their larger size and contents, which, from their structure and orientation, are highly suggestive of archicarps consisting of a basal oogonium bearing a trichogyne above as a separate cell; the trichogyne abuts on another larger cell, possibly an antheridium. The cytology of these structures is still under investigation. No fertilization was observed, but the cells of the archicarp were seen in some cases to break down, suggesting a scolecite formation; it is, however, probable that these structures are abortive. The paraphyses developed from large basal apothecial cells are straight, with pointed tips, and linked together with well-marked H-connexions. A transverse section of an apothecium with young developing asci shows the latter arising in groups at definite intervals and emanating from a complex of cells. At this stage changes are seen to take place within the dome of the apothecium in preparation for dehiscence of the latter. A tangential slit is developed in the roof, and this gradually widens, forming a cavity filled with gelatinous material. The gelatinization is not progressive, but the cavity gradually gets bigger, probably owing to absorption of water causing the inner part of the roof immediately below the cavity to protrude into the apothecium. This would bring about increase of pressure within the closed apothecium, and, owing to the convexity of the roof, increase of pressure from below, together with absorption of moisture into the cavity, would ultimately bring about rupture of the outer wall of the roof. In

newly opened apothecia we find the cracks occupied by a yellowish exudate. The exudate dries on exposure to the air and pulls up the protruding inner wall of the roof, which finally becomes broken. The apothecia are now fully open, and the ascospores are liberated in enormous quantities. The young ascus shows a well-defined nucleus with a well-marked nucleolus. The needle-shaped spores are grouped in the ascus, a central spore being surrounded by the remaining seven, each with a well-marked sheath. The ascus opens in an irregular manner and the spores are shot out of the apothecia periodically.

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