

CHAPTER 9

CONTROL

THROUGH

LEGISLATIVE

ACTION

Ever since the very earliest stages in the spread of *Achatina fulica* from its East African homeland, there have been various edicts and decrees urging or demanding that the local people co-operate in collecting the snail specimens and assist in preventing their spread into uninfested areas. Some investigators (e.g., Corbett 1933) in addition suggested that all foreign plants be subject to inspection before entering the country. By and large, these early measures were only of transitory, if any, effect, largely through the fact that it requires much more than regulations to stem the tide of this giant snail pest.

Forcible and effective quarantine regulations against *A. fulica* were not promulgated until 1936. Early in May of that year, it was decided by the Ministry of Agriculture and Forestry in Japan that this snail had clearly earned for itself in Formosa the reputation of being a serious pest. Forthwith there were set up emergency regulations which permitted the confiscation not only of all specimens entering Japan, but of all living specimens in the country at that time (Pemberton *et al.* 1939, Esaki and Takahashi 1942). A concerted program of propagandizing the imagined medicinal properties of these snails had succeeded, in the years previous to that, in spreading them into many areas. The thoroughness with which the regulations were carried out, and probably to a lesser extent the severity of the winters in Japan, together stamped out all sign of the giant snail. There is today no evidence of its having become established in that country. This is the

only instance known where *A. fulica* has gained entrance to an area and has been completely eliminated. It should be kept in mind, however, that because these snails were cherished and coveted right up to the time they were banned, they never actually became "established" in the real sense of the word.

Such, unfortunately, is not the history of the Hawaiian infestation. Two-year-old populations of the giant snail were discovered in both Maui and Oahu in November, 1938 (Pemberton 1938, Mead 1949*b*). Every effort was made to stamp out these infestations and, for a while, it seemed that the snail had been eradicated. In fact, eradication was announced by several prominent papers dealing with this subject. But it was the same old story all over again. Live individuals were continually found in the areas of the original infestation. Persistent control measures (costing in excess of \$200,000) coupled with stringent quarantine regulations, with heavy penalties for people caught transporting the snails or even having them in their possession, did succeed in keeping the infestations pretty well corralled until 1951 (Fullaway 1943). In that year, a number of new loci were discovered, in both Oahu and Maui, in some cases miles from the original site of infestation (Wong 1951). These discoveries have made intra-island quarantines essentially impractical and have moved one government official to state, "We simply do not have the money to resort to measures approaching eradication. We have the snail in such quantities on Oahu today and it is in so many places that it now becomes a matter of individual control and not a possible function of the Government—just like exotic weeds and insect pests in wide variety." Inter-island quarantines, on the other hand, were successful in preventing the spread of *A. fulica* to any of the other islands in the Hawaiian chain for a period of twenty years. The discovery of established infestations on the islands of Hawaii and Kauai in 1958, however, clearly demonstrated once again that in spite of the best quarantine regulations this pest may be able eventually to effect a breakthrough.

Shortly after the inception of the Trust Territory of the Pacific Islands, a set of basic quarantine regulations was drawn up to limit as much as possible any further spread of plant pests, including the giant African snail (U.S. Navy 1950, Pemberton 1954). These have provided the authority for the promulgation of numerous specific quarantine regulations and controls, a general policy for which is discussed by Bryan (1949) and Cooley (1950) (cf. ICCM 1947, 1948). Subsequently, the Philippine government set up comparable regulations imposing fines and/or imprisonment for offenders (Pangga 1947).

In the United States, California has had for a number of years specific quarantine regulations covering the threat of introducing snail pests. For over thirty years, that state has been battling foreign snails at a cost of over \$500,000. During this time, only one of four introduced helicines, *Theba pisana*, is believed finally to be eradicated (Armitage 1949) in spite of notes in the literature to the contrary (USBEPQ 1953). Finding as many as 3,000 specimens on a single orange tree is a good index of the seriousness of the problem that this species has presented (Gammon 1943). Attempts by the state to control two of the other helicines, *Helix aspersa* and *Otala lactea*, have been considered impractical because they have become too thoroughly established in many different areas (Messenger 1950). The fourth helicine, *Helix aperta*, has a narrow but firm toehold in the San Diego area. Concerted efforts are still being made to eradicate this snail. Its habit of retreating deep underground for long periods of time, however, has so far frustrated every attempt. California border and port quarantine inspectors have for years periodically intercepted shipments of these and other species of potentially harmful snails. For example, in July, 1951, 122 cases of living *H. aperta* from Tunisia were intercepted at one of California's border stations after passing through New York as a port of entry (Messenger *in litt.* July 13, 1959).

Experience of this sort, coupled with considerably more experience with introduced, pestiferous insects, mammals, and birds, has moved such investigators in California as Storer (1931, 1934, 1949) and Hanna (1939, 1948) to take an unequivocal stand against introduction of foreign animals. In fact, it was these two investigators who were responsible for bringing to the attention of the proper authorities the fact that two specimens of the largest of all land snails, *Achatina achatina* were to be found alive in California (Dickson 1946, Hanna 1948, Mead 1949b). These two specimens and all their eggs were quickly destroyed. But this incident in addition to the sudden interception of about fifty live specimens of *A. fulica* during California port inspection of war salvage material in 1947 (Messenger 1947) speedily put California's well-organized quarantine service into high gear. And in spite of the fact that, since 1947, over ninety live specimens of *A. fulica* have been intercepted in California ports, this snail pest has never become established in the slightest, reports in the literature to the contrary notwithstanding. Unfortunately, the campaign in Southern California to eradicate *O. lactea* in 1951 caused many to believe that *A. fulica* had at last become established in California, as newspapers referred to *O. lactea* as the "African Snail" and the "striped African Snail."

Not only has there been a redoubling of effort in California to detect the possible presence of the giant snails in cargoes, but rigorous steps are taken when the snails are found. The holds are fumigated with methyl bromide or hydrocyanic gas. Infested war salvage equipment, and such other equipment that can stand it, are treated with KOH or NaOH in live steam (Messenger 1952). During the years 1949, 1950, and 1951, six, eight, and twelve interceptions, respectively, were made in California ports (Messenger 1949-51). An explanation for this increase, according to Messenger (*in litt.* July 8, 1952), is found possibly in the fact that war salvage material from the Mariana Islands was being obtained from areas deeper and deeper into the bush where prolonged overgrowth with vegetation provided more suitable retreats for the giant snails. In the years 1952 through 1958, the interceptions were 5, 8, 0, 0, 0, 1, and 0, respectively (Messenger 1952-54, Messenger and Breech 1958). At this writing, there have been reported no interceptions of *A. fulica* in California in 1959 and 1960. The reduction in interceptions undoubtedly finds its explanation in the fact that there has been a commensurate reduction in, and finally a virtual discontinuance of, the process of bringing war salvage material into United States ports. To a much lesser extent, the marked decline in the snail populations in the infested areas may be having its effect.

Chapter 49 of the Arizona Code amply provides for measures to meet the threat of introducing foreign snails. California and Arizona, then, are the only two states which have quarantines so designed that snails can be excluded. In contrast, before 1951, the federal quarantine regulations lacked any provision for prohibiting the entry of snails. These facts were pointed out by Mead (1949*b, c, e*) and the danger inherent in such a setup was emphasized. With this, the U.S. Public Health Service issued orders for its inspectors to assist the USDA plant quarantine inspectors in their attempts to intercept the giant snail. Legally, however, this could not be enforced as the USPHS Regulation 71.156 provides only for an "animal . . . vector of human disease or any . . . animal . . . capable of being a vector of human disease." In addition to all the depredations of the giant snails, they cannot so far be justly accused of being vectors of human disease. Morgenstern (1949) most unfortunately was confused on this point. The fact that the dying snails form potent sources for the breeding of disease-carrying flies provided the only tangible connection with public health, but this was so tenuous that it could not conceivably be embraced by the existing regulations.

Photostat copies of Mead's article (1949*b*) were sent by the U.S.

Army to personnel in snail-infested areas in the Pacific islands in an effort to reduce the spread of the snail in those areas and minimize the chances of the snail's showing up on army equipment returned to the States. Such steps as these could at best be only temporary expedients. Interceptions of the giant African snails in other ports of the United States added further emphasis to this point. After a single live giant snail specimen was found in San Diego on a ship carrying war surplus from Manila, a message of warning was sent ahead of the north-bound ship to San Francisco, Portland, Seattle, and Vancouver. The alerted inspectors in Vancouver found eight more snails in the cargo; fortunately, all of the specimens were dead (Gardiner 1949, Zuk 1949). Another ship carrying 8,000 tons of war salvage material from the Pacific was found in Baltimore, Maryland, to be snail infested. The inspectors sought and received the co-operation of the importers, and recommendations to fumigate the entire cargo with HCN gas were carried out (Brubaker 1950). But it cost the importers \$22,500! The giant snails were found on still another ship in that same year of 1949 in Newark, New Jersey. An accidental fire brought a quick solution to the problem by destroying the cargo—and the snails. In 1950, snails were found in the cargo of a ship landing at New Orleans, Louisiana, (cf. McCrory 1950). The following year, a shipload of scrap metal from Guam was similarly found infested with the giant snail in Portland, Oregon, and was fumigated before it was discharged (Burch 1951).

With the American public now informed (and in some cases, unfortunately, misinformed) by the publicity given in scientific journals, magazines, and newspapers to the problem of the giant African snail, definite steps were taken to set up legislation empowering the Department of Agriculture to prohibit entry of this snail. Representative Wingate Lucas, in response to the urging of the people of Texas, was the first to start such action. On the basis of an original inquiry directed to the author, it was decided by Lucas to introduce bill HR 6242 in the 81st Congress on September 27, 1949 and it was immediately referred to the Committee on Agriculture. The wording of the bill, however, was unfortunately such that only *A. fulica* would be excluded. Any person acquainted in the slightest with the giant African snails knows that any one of the many species in that big group probably has the potentiality of becoming as serious a pest as *A. fulica*. Immediate but unsuccessful attempts were made to obtain a rewording of the bill (Mead 1950b:44). It was agreed by many that the bill as it stood would at least meet the immediate problem at hand. Others frankly feared the bill was a hasty outgrowth of a "snail panic" and that it would bring undesirable legislation (cf. Anon.

1949*b*). Nine months later (June 28, 1950), Representative Harold D. Cooley, chairman of the Committee on Agriculture, released HR 6242 from committee without amendment. His Report No. 2363 carried an indorsement of approval both from his committee and K. T. Hutchinson, assistant secretary of agriculture. After passing to the Committee of the Whole House on the State of the Union, it was read before the House and passed without amendment on July 27, 1950. The following day it was read before the Senate and referred to the Committee on Agriculture and Forestry. Four months later (November 29, 1950), Senator Elmer Thomas reported back to the Senate from this committee and recommended (Report No. 2583) that HR 6242 be passed without amendment. In spite of this recommendation, Senator B. R. Maybank proposed an amendment (cf. Cong. Rec. 96[12]:16621) to this bill and it was passed by the Senate. The title of the bill was changed to "An Act to Amend the Agricultural Adjustment Act of 1938, as Amended, and to Prevent the Entry of Giant Snails into the United States, and for Other Purposes." The bill, in this hybridized form, quite understandably failed to receive favorable action and died in the House during the last-minute rush of the 81st Congress. This meant starting all over again.

This time, however, the author solicited the help of senate majority leader E. W. McFarland as well as that of Representative Lucas. The wording of the old bill was revised to include "any terrestrial or fresh-water mollusk." It was introduced as S 1489 to the Senate on May 15, 1951 by Senator McFarland and referred immediately to the Committee on Agriculture and Forestry. On August 9, 1951, Senator Ellender of this committee submitted a report (No. 628) indicating that this bill had the approval of Secretary of Agriculture C. F. Brannan and recommending that it be passed without amendment. An identically worded bill was introduced as HR 4443 to the House on June 13, 1951 by Representative Lucas and referred to the Committee on Agriculture. Once again, Representative Cooley of that committee reported back on the bill, recommending on August 7, 1951 that it be passed without amendment. His report (No. 800) carried a message of approval from Acting Secretary of Agriculture C. J. McCormick. The bill was read before the House on August 20, 1951 and passed without amendment. A week later, S 1489 came up for reading in the Senate and it was agreed to substitute HR 4443 and to pass it without amendment. On September 12, 1951, HR 4443 was signed by both the Vice-President and the Speaker of the House. Ten days later, it was signed by President Truman and became Public Law 152 of the 82d Congress (cf. Smith 1951, Burch 1952*b*).

Under this new authority, the Secretary of Agriculture was em-

powered to draw up regulations controlling the entry of mollusks in this country. Advice was sought from many persons, agencies, and institutions during their preparation. Acting Secretary of Agriculture K. T. Hutchinson published on July 25, 1952 a notice of the proposed regulations and copies were sent to the sources of advice for criticism and suggestions. The revised regulations were published by Acting Secretary of Agriculture C. J. McCormick on October 22, 1952 and became effective that date (Anon. 1953*b*). The following quotation from McCormick (Cooley and McCormick 1951) explains how this "snail legislation" will fit into the long-range plans of the Department of Agriculture: "A study is now being made by the Interdepartmental Committee on Pest Control of proposed legislation which would encompass a much wider field than is covered in HR 4443. This proposed legislation will probably include provisions for control of such plant pests as worms, insects, nematodes, slugs, and snails, any form of protozoa, fungi, bacteria, or other living parasitic plants, any living viruses, and similar or allied organisms, which can directly or indirectly injure or cause disease in plants or parts thereof. It will require considerable time to complete the studies which are being made with respect to such legislation. . . ." The existing regulations, however, will not just function in an interim fashion but will reveal through actual application just what is really needed in the proposed more extensive legislation.

With the assistance of the publications of Ling (1952, 1954) and the FAO Plant Protection Bulletin, a cursory check was made of abstracts of the plant quarantine regulations of somewhat over one hundred governments. Slightly less than 3 per cent, that is, only three governments, viz., the Republic of the Philippines, Union of South Africa, and the United States of America (Anon. 1953*b*) were listed as making specific mention of "mollusks" among the animals prohibited or restricted. Less than 8 per cent of the total were listed as having an "invertebrate" clause to cover agricultural pests other than insects, thus technically embracing the mollusks. The countries included were: Canada, Ceylon, Chile, Kenya, New Zealand, Sudan, Trinidad and Tobago, and Uganda Protectorate. Nine other countries, the greater share of which are small island governments, had vague, all-inclusive clauses which presumably would give them the authority for excluding harmful mollusks (e.g., "and other small animals," "organisms or other agents," "living pests in any stage," "any object carrying an injurious pest," and so forth). But over 80 per cent of the governments listed had little more in their regulations than the restriction and prohibition of certain specific pests and diseases without any clause worded broadly enough, apparently, to pro-

vide authority for the exclusion of harmful mollusks. It can be seen from this survey that the vast majority of the governments have neither given consideration to the problem of excluding molluscan pests, actual or potential, nor prepared themselves for such an eventuality.

With respect to *A. fulica*, the quarantine picture is much less clear in other countries. In England, Sir W. Wakefield especially has been concerned about the threat of the giant snail in the colonies and has brought the matter to the attention of Parliament (Anon. 1949*d*). In Australia, T. H. Harrison (1951) reported that two interceptions of *A. fulica* in Sidney taught them that their regulations were inadequate; hence there was passed Statutory Rule 1948, No. 92, which authorizes the inspectors to follow produce to the warehouses if necessary to intercept the snails. Quarantine inspection of imports is also effective in Sarawak, according to Tom Harrison of the Sarawak Museum (*in litt.* Aug. 25, 1952). Internal quarantines on the other hand present quite a different problem as indicated in Harrison's words, "Control within the country is quite impracticable as communications are by water in thousands of small craft often carrying leaf-thatch, vegetables, etc." In reports and correspondence, similar reasons are given for the lack of specific quarantine regulations for this snail in India, Indonesia, Malaya, and the Seychelles Islands.

Some (e.g., Anon. 1948*c*) have insisted that definite steps should be taken in the infested areas to force the people to collect the snails by hand and destroy them. Although large-scale collections of this sort produce a discernible effect upon the snail population, they are only ameliorative and transient, and most certainly do not warrant the sizable expenditures of governmental funds that have been made in past times—especially during snail population build-up. As the only inexpensive means available of controlling the snails, the people should be "urged" to collect and destroy them in their own areas; but attempting to exert force along this line through legislation would be advisable in only the most unusual cases.

One thing is certain about quarantine regulations: Snails cannot be legislated out of existence. At best, quarantines may delay indefinitely the entry of the snail pest. The more carefully the quarantines are thought through and carried out, the more effective will be the barrier and delaying action. As in all good quarantines, even though there is no guarantee of permanent exclusion of the pest, there is provided more time—"borrowed time"—in which to develop more effective controls and perhaps even eradicated measures that do not now exist. In this way, external quarantines, and in some cases internal quarantines, can be effective and practicable. Thus they warrant serious consideration in any long-range planning.