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A collaborative report.

COMPARATIVE SKIN TESTS WITH TWO STEMPHYLIUM SPECIES

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THE MATTER OF GROUP sensitivity among molds has confronted allergists for a great many years. Several authors in the earlier literature^{1,2,3,4} stressed the importance of species sensitization in allergic diseases caused by inhalant mold allergens. These reports dealt with allergic symptoms in greenhouse workers exposed to the fungus pathogen, *Cladosporium fulvum*, growing on tomato plants. Patients sensitive to *C. fulvum* failed to react by skin test to other *Cladosporium* species, and two⁴ reacted negatively to other dematiaceous genera. More recently Mandell⁵ reported differences in provocative nasal test responses between species of the genus *Stemphylium*; he felt that *Stemphylium solani*, a tomato pathogen, was the most significant *Stemphylium* species for patients in his area.

It was to study the allergenicity, by skin test, of two species of *Stemphylium*, *S. botryosum*, and *S. solani*, that this collaborative project by members of the Association of Allergists for Mycological Investigations was undertaken.

Methods

In 1969 MMP allergens^{*} were prepared simultaneously from the two *Stemphylium* species, *S. botryosum* and *S. solani*. The *S. botryosum* allergen was prepared from the species we employ regularly in routine MMP allergen production. The *S. solani* culture was obtained from the American Type Culture Collection.

The allergens were supplied as 1:100 glycerinated concentrate for scratch or pressure puncture testing, and in aqueous dilutions of 1:1,000,000, 1:100,000 and 1:10,000 for intracutaneous testing, along with appropriate control solutions. The weight/volume designations for the respective dilutions in terms of the lyophilized allergen are those we regularly employ in routine skin testing.

Comparative tests were made on 31 patients sensitive to *Stemphylium* allergens, and on 12 patients not sensitive to *Stemphylium*.

^{*}Available from Hollister-Stier Laboratories.

Results

The results of the tests are shown in Table I.

Significant results of the tests are seen in the scratch or pressure puncture reactions. Twenty-two of the 24 patients tested by the scratch or pressure puncture technique reacted to *S. botryosum* while eight reacted also to *S. solani*. One of Browning's patients reacted only to *S. solani*; this was confirmed by retests.

Further tests by the intracutaneous technique were performed on five of the patients who had reacted negatively to *S. solani* by scratch or pressure puncture tests. These continued to reveal negative reactions to *S. solani* in three patients, but two patients reacted to *S. solani* in the intracutaneous tests. Browning's patient who reacted only to *S. solani* in the pressure puncture tests failed to react to *S. botryosum* in the strongest or 1:10,000 intracutaneous

test strength. One investigator (Weiner) performed only intracutaneous tests on all of his patients; these tests revealed reactions to both species.

Discussion

The failure of *Stemphylium solani* to react on 50 percent of the patients by the scratch or pressure puncture technique significantly reflects differences in allergenicity of the two species for these particular patients.⁶ Two of the patients who reacted negatively to *S. solani* in the preliminary scratch or pressure puncture tests reacted to some degree on intracutaneous tests, and all of Weiner's patients, tested only intracutaneously, reacted to *S. solani*. However, and we believe significantly, Weiner's skin test reactions to *S. solani* tended to be of a distinctly lower magnitude than were the reactions to *S. botryosum*. This difference was also

TABLE I.

Collaborator	Patient	Scratch (Pres. punc.)		INTRACUTANEOUS					
		S.bot.	S.sol.	1:1,000,000		1:100,000		1:10,000	
				S.bot.	S.sol.	S.bot.	S.sol.	S.bot.	S.sol.
H.E.P.	W.D.W.	++	—	+	—	+++	—	—	—
	S.C.	+++	—	—	—	—	—	—	—
	L.B.	++	—	—	—	+	—	—	—
	M.M.	+	—	—	—	—	—	—	—
G.T.	B.	++++	—	+++	—	—	—	—	—
	C.	++++	+	++	+	+++	+	—	+++
W.H.B.	J.H.	+++	—	—	—	—	—	—	—
	W.D.N.	—	—	—	—	—	—	+++	—
R.A.Y.	R.T.	—	+++	—	—	—	—	—	—
	N.B.	++	++	—	—	—	—	—	—
	L.S.	++	—	+++	++	—	—	—	—
	J.D.	+++	++	—	—	—	—	—	—
J.H.	S.J.	+++	—	—	—	—	—	—	—
	D.L.	++	—	—	—	—	—	—	—
	W.O.	++	+	—	—	—	—	—	—
	J.H.	+++	+	—	—	—	—	—	—
A.W.	A.B.	+++	+	+	—	—	—	—	—
	L.S.	+++	—	—	—	—	—	—	—
	G.S.	+	—	—	—	—	—	—	—
	G.J.	+++	+	—	—	—	—	—	—
A.W.	J.K.H.	++	+	—	—	—	—	—	—
	M.W.	++	+	—	—	—	—	—	—
	J.K.	++	—	—	—	—	—	—	—
	S.C.	++	—	—	—	—	—	—	—
	V.M.	—	—	+++	+	+++	—	+++	++
	J.S.	—	—	+++	++	+++	—	+++	++
	L.G.	—	—	+++	++	+++	—	+++	++
	J.D.	—	—	+	+	+	—	+	+
A.W.	M.D.	—	—	+++	++	+++	—	+++	++
	B.H.	—	—	+++	+	+++	—	+++	++
	L.O.	—	—	+++	++	+++	—	+++	++

noted in the reactions to the two species in the scratch or pressure puncture tests, where it is doubtless of greater significance.

An observation in Weiner's report is significant. This investigator had never employed *Stemphylium* allergens, and did not have available any patients known to be sensitive to this genus. However, on testing eight *Alternaria* sensitive patients, he discovered seven who reacted to both of the *Stemphylium* species. This similarity of reaction to *Alternaria* and *Stemphylium* points to dermataceous family sensitization.^{7,8}

Reactions to the two *Stemphylium* species suggest both generic and species sensitizing capacity. Genus sensitization is suggested in those patients who reacted to both species; both species reacted in tests on seventeen patients. Thirteen patients reacted only to *Stemphylium botryosum*, and Browning's one patient reacted only to *S. solani*. These reactions to only one species can be interpreted as species sensitization.

The distribution of *Stemphylium* as an aeroallergen could well be considered here. *Stemphylium* was recovered from all of our survey stations where sampling was adequate to reflect general trends and seasonal incidence. Only *Stemphylium botryosum* was encountered in these studies, confirming that this species is of general distribution throughout the United States.

On the other hand, *Stemphylium solani* is of local incidence as a plant pathogen, most often occurring on tomato plants. For this reason widespread distribution of *S. solani* would not be anticipated in aerobiological populations. In commenting on our findings, W. C. McDonald, plant pathologist in the Canadian Department of Agriculture, had this to say: "*Stemphylium botryosum* attacks a large number of

hosts, is a good saprophyte, and occurs in all parts of the country. On the other hand, *Stemphylium solani* is restricted to a few hosts and has a limited distribution. This would explain why you do not encounter it in your sampling."¹⁰ Further support of the infrequent occurrence of *Stemphylium solani* is the fact that this species is rarely if at all mentioned in general references to plant pathogens.

We wonder whether these recognized differences in distribution of the two *Stemphylium* species might explain reactions of at least some degree to *Stemphylium solani* in all of Weiner's patients, although this species reacted on no more than half of the patients of the other collaborators.

We cannot agree with Mandell's statement⁶ that *Stemphylium solani* is the major offender in the genus *Stemphylium*. On the other hand, this could be true in exceptional cases, as in Browning's one patient who reacted only to this species. *Stemphylium botryosum* was definitely reactive on more of the 31 patients studied in this report than was *S. solani*. Furthermore, *S. botryosum* produced reactions of greater magnitude even in those patients who also reacted to *S. solani*.

Sensitization to *Stemphylium solani* suggests a parallelism with allergic disease caused by *Cladosporium fulvum* mentioned earlier in this paper. In both instances the offending agent is of limited distribution, and appears to be related to the host plant.

Summary

From this study, both generic and species sensitization for *Stemphylium botryosum* and *S. solani* allergens is suggested, but the genus reactivity for both species appears to be more prominent than the species reactivity of either species. It would seem that *Stem-*

phylium botryosum may be more representative for the genus than is *S. solani*. Stemphylium reactions in Alternaria sensitive patients suggest dematiaceous family sensitivity.

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THE THEORY OF NATURAL SELECTION

"The theory of natural selection rests on two main classes of facts which apply to all organized beings without exception, and which thus take rank as fundamental principles or laws. The first is the power of rapid multiplication in a geometrical progression; the second, that the offspring always vary slightly from the parents, though generally very closely resembling them. From the first fact or law there follows, necessarily, a constant struggle for existence; because, while the offspring always exceed the parents in number, generally to an enormous extent, yet the total number of living organisms in the world does not, and cannot, increase year by year."

Alfred Russel Wallace, Darwinism, 1889.