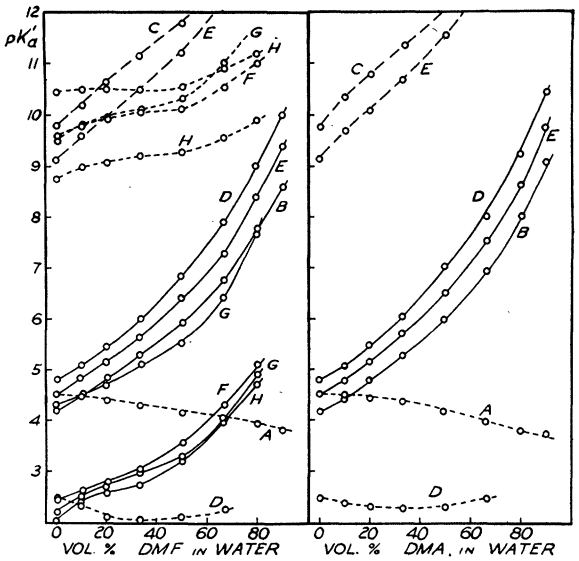

Fig. 2. Change in pK'_a with volume percentage of DMF and DMA in water. Solid lines, carboxyl groups; dashed lines, hydroxyl groups; and dotted lines, amino groups. The compounds titrated are identified by letters: (*A*) aniline; (*B*) benzoic acid; (*C*) phenol; (*D*) *p*-aminobenzoic acid; (*E*) *p*-hydroxybenzoic acid; (*F*) *dl*-alanine; (*G*) *l*-glutamic acid; and (*H*) *l*(+)-lysine.

vent. Plots of pK'_a versus log concentration of water in DMF yield a reasonably good line at the higher concentrations for aliphatic carboxylic and dicarboxylic acids, but such regularity is an exception.

Rigorous treatment of the factors that affect the values of dissociation constants in nonaqueous or mixed media is given in the literature (*5*). For empirical application of these measurements to qualitative organic structure analysis, it is not necessary to have complete knowledge of such factors, among which are (i) the change in hydrogen-ion activity and the consequent change in glass electrode response to concentrations of acid or alkali, (ii) the change in dielectric constant of the medium, and (iii) the change in solvation or hydrogen bonding of the ionizing groups. Interaction of these effects leads to nonuniformity of the plotted curves but does not interfere with their empirical use in determining the nature of dissociating groups.

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More on Contemporary Science and the Poets

Apparently J. Z. Fullmer originally set out to discuss, in her article on contemporary science and poetry [*Science* **119**, 855 (1954)], the use of scientific terminology and references to technologic objects in poetry. Judging by her communication [*Science* **120**, 953 (1954)], one can assume that she did not intend that the subject should get so far out of hand as it did in the letters of Hagopian and Hirsch. The fatal error that led to this is contained in this statement in her letter:

> Questions about the function of the poet are different, not only in degree from the problem in "Contemporary science and the poets," but also in kind. They are in fact *sui generis.*

This error is the separation of form from content, which is a grave and fundamental error. Hirsch makes this same error in a most explicit and flagrant way:

> It is a misconception . . . to think that it is the task of poetry to interpret man's place in nature. This is the province of philosophy. The poet is preoccupied with images, form, and expression. . . .

Hagopian also tends toward this error, with his emphasis on "symbolic linguistic forms" and their use in the presentation of "human conative-affective experiences."

All three writers are caught in a fatal dualism—that is, the separation of the mind and the material universe into two incompatible and irreconcilable worlds. This leads them to compartmentalize human knowledge and experience to such an extent that Hirsch not only concludes that no real fusion is possible between poetry and science but that they will diverge even further in the future. Thus, we find it asserted that science does not deal with the fundamental questions of the universe, that poetry deals only with images and form, and that the symbolic forms of art and science are fundamentally different (Hagopian quoting Langer).

All these assertions are in basic error. Science must deal with the fundamental questions of the universe, and so must poetry! The real, material universe exists and is a basic reality. Human life and thought are a part of it and emerge from it. Thought is the result of the activity of an organized part of the material world, and the human brain is a reflection of, and in interaction with, this material universe.

It follows from this that Hinshelwood, as quoted by Fullmer, is incorrect in stating that science is

> . . . the attempt by the human mind to order these facts into satisfying patterns. Now a pattern or de-

> sign is not a purely objective function but is something imposed by the mind on what is presented to it. . . .

This is subjective idealism at its worst and must be rejected as a viewpoint leading to a blind alley instead of to progress. Rather, science is the attempt to reflect, in our concepts and formulations, as close an approximation of the true reality of the universe as is possible with the methods and theories of the day.

The task of science is not merely to learn more and more about the inexhaustible universe and then to order the facts learned into a pattern more and more closely approximating the true reality. Rather, the task of science is to *apply* these facts and theories in order to have greater control over our environment (and ourselves) for our social benefit, both materially and, *ipso facto,* spiritually.

Similarly, the task of the poet is not just to reflect reality, as a barometer, although this is a necessary precondition, but to interact with it and to give form, direction, and *content* to human relationships and aspirations as they relate to the real world. Poetry *must*—and here I dissent most vigorously from Hagopian and Morriss—make statements and judgments about values and *must* be partisan on the issues of the day, or be recognized by all as sterile pap and be promptly rejected. The poets of yesterday knew this. Did not the great, but nameless poets of the Negro spirituals make value judgments about freedom and slavery? Did not Whitman, Longfellow, and Whittier take the part of freedom and democracy in their poetry? Did not Kipling consciously apologize for British imperialism in India in his poetry? Did not Milton voice the position of the rising British middle class? They did, and each of them reflected the real world and interacted with it and expressed the viewpoint of some part of human society.

Do we sing the subjective poetry written only in lower-case letters, in isolated letters, and in typographical symbols? Or do we sing the Negro spirituals? The people know which is real and which is not, even if the "philosophers" do not. That some poet may discuss quartz prisms, and so forth, is indeed irrelevant if the terms are used only as forms and lack content and meaning.

Philosophy is not a separate discipline over and above science, poetry, or any other phase of human activity. Philosophy is the organization of knowledge of the real world into as accurate reflection of it as possible and the turning of this knowledge to the beneficial control of the universe. Into philosophy, then, go the findings of science, music, poetry, and so on. They are all integral, constituent, and interacting parts of the whole of knowledge and, therefore, cannot be incompatible and incapable of fusion.

As long as poets remain "vague, mystical, symbolic, antilogical"—that is, as long as they turn from reflecting, interpreting, and passing judgment on the real world and go instead into their own limited, subjective, form-sans-content world of "experience" divorced from reality—we will be plagued with this reactionary and dangerous dualism (because it departs from reality), compartmentalism, and consequent antagonisms between men.

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Hammond's aptest observation is that the discussion following "Contemporary science and the poets" has gone out of hand. The problem of that paper—to confront some modern poetry with contemporary science as a practicing scientist conceives it, with the hope of determining whether or not modern poetry contains the findings of modern science—from the outset excluded discussion of the function of the poet or the function of the scientist. These questions of function are interesting, but an author can hardly be guilty of a grave, fundamental error when he chooses to limit his attention to one clearly defined problem.

At the outset, too, my paper excluded from the discussion technologic objects mentioned in poetry as well as the isolated use of scientific terms; the assertion was not made "that science does not deal with the fundamental questions of the universe." Hammond's further statement that the "task of science . . . is to *apply* these facts and theories in order to have greater control over our environment . . ." stands on shaky ground. This view recently has been so devastatingly controverted by H. Dingle [*The Scientific Adventure* (Pitman, London, 1952), p. 7)] that it will not be discussed here.

Hammond's catalog of the great poets—Whitman, Longfellow, Whittier, Kipling, Milton, and the creators of the Negro spirituals—is certainly of interest. When the criterions by which the selections were made are examined, one is forced to the realization that their application would exclude the bulk of Shakespeare's poetic work, for instance, from the category "great poetry." Although catalogs of greatness are personal matters, the wisdom of such an exclusion strikes me at least as being dubious. (In this connection it may be mentioned that Hirsch's criterions, "vague, mystical, symbolic, antilogical," worked to exclude from consideration *De Rerum Natura,* which, he earlier inferred, belongs in the category of great poetry.)

Yes, Hammond observed correctly when he felt that the discussion of the problem in "Contemporary science and the poets" has gone out of hand.

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