formation of energy-rich phosphate bonds, probably at the glyceraldehyde-3-phosphate dehydrogenase step only, is required for the uptake of uric acid. This is consistent with the known action of arsenate (*9*) on glucose metabolism. (iv) After the maximal accumulation of uric acid by the yeast cell, the uricase activity of the cell increases at a constant rate until all of the uric acid is metabolized. (v) After the maximal accumulation of uric acid by the yeast cell, the uric acid is metabolized at a constant rate.

The properties of the yeast uricase are being investigated and compared with animal uricase. A detailed study of the uptake of uric acid by the yeast cell is in progress in these laboratories.

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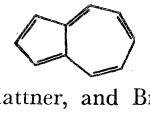
26 March 1956

On the Space Group and Molecular Orientation of Azulene

In their investigation of the structure of the nonbenzenoid hydrocarbon azulene,



Günthard, Plattner, and Brandenberger (*1*) reported that the x-ray space group extinctions of the crystal correspond to $P2_1/a$, and that the unit cell contains 2 molecules. This requires positioning of the molecules on centers of symmetry, which is possible only if disorder is present. Günthard (*2*) was unable to solve the structure in this space group.

We have reexamined the structure (*3*). Lattice constants of the monoclinic crystal are $a = 7.89 \pm 0.03$ A, $b = 6.06 \pm 0.03$ A, $c = 7.94 \pm 0.03$ A, $\beta = 103° \pm 0.5°$, $a:b:c = 1.301:1:1.130$. We also find x-ray extinctions which would lead one to assign $P2_1/a$ as space group. The calculated specific gravity of 1.165 compares well with the measured value of 1.17. There are indeed 2 molecules per cell. A test for piezoelectricity was negative.

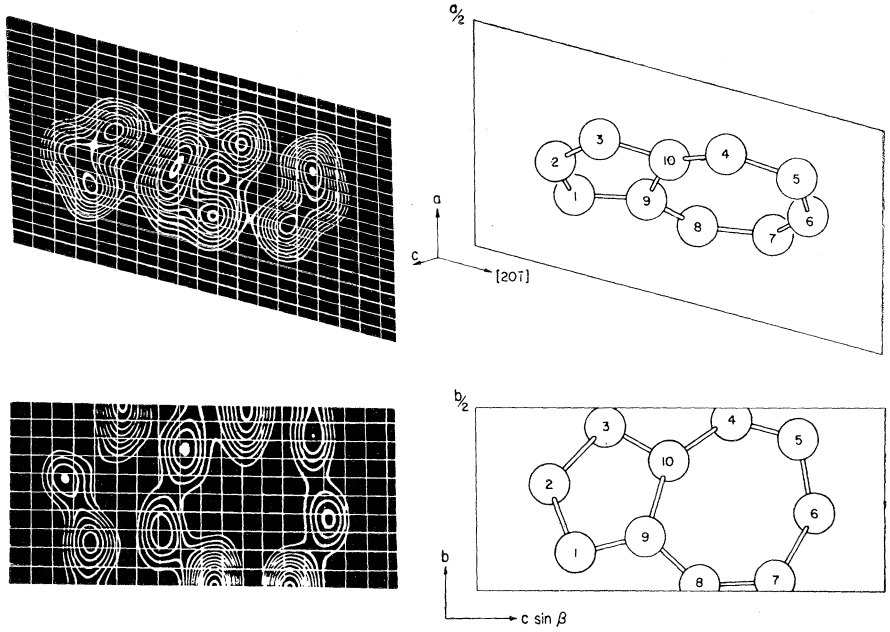


Fig. 1. Fourier projections of azulene on (010) and (100) planes and corresponding projections of molecule.

There is no evidence of disorder in any layer lines of the Weissenberg patterns. If random orientation of the molecules is present, it is thus on a molecular level; that is, there are no small ordered regions, of the nature of twin domains. Since the dipole strength of azulene is high, such a random arrangement is unlikely; that is, one would at least expect to find small ordered domains. We have examined the possibility of the random arrangement in $P2_1/a$ crystallographically; and we have compared this possibility with consequences of the assumption of a space group of lower symmetry—either $P2_1$ or Pa, with the extinctions which suggest a screw-axis along b owing to a pseudo translational symmetry in that direction. In the case of the lower symmetries, we have assumed that piezoelectricity is unobservable owing to weak electromechanical coupling.

$P2_1$ can be excluded because the glide a cannot be included as a pseudo-symmetry. Pa is a distinct possibility. If the projection of molecules on the b-axis is symmetrical about a point lying halfway between the glide planes, $(0k0)$ reflections will appear only if k is even; this would then explain the extinctions that led one to expect a twofold screw-axis. Taking the glide planes at $(x,0,z)$ and $(x,1/2,z)$, the polar axis of azulene will be on or very close to $(x,1/4,z)$ when adjoining molecules are at most reasonable distances.

Intensity data were obtained by the multiple-film technique using $CoK\alpha$ radiation ($\lambda = 1.79$A). The approximate orientation of the molecule on the (010) plane was derived from a weighted reciprocal lattice $(h0l)$, in which strong reflections were observed in a distorted hexagonal arrangement. The vector transform of the projected molecule thus derived was in good agreement with the peaks of a sharpened Patterson, computed using $F^2(h0l)/\Sigma f_i^2$ as coefficients. Since glide a is the only symmetry element, the molecule could be located at any place in the asymmetric unit of the (010) projection. For the phase calculation, the center of the polar axis of the molecule was located at (0,1/2). The real part of the structure factor for Pa then corresponds to the *entire* factor for the case of a disordered structure in $P2_1/a$; and it thus is a simple matter to compare possible structures in Pa and $P2_1/a$.

Symmetry Pa was fully supported by successive S-FAC and X-RAC calculations, which resulted in a well-defined Fourier projection $\rho(x,z)$. The R-factor was reduced to less than 20 percent for $F(h0l)$ in Pa. The R-factor for the already unlikely case of a random structure in $P2_1/a$ could not be reduced below 24 percent. Fourier projections $\rho(x,z)$ and $\rho(y,z)$ are shown in Fig. 1. Atomic coordinates derived from these are given in Table 1.

The y parameters result in no observable intensities for odd-order $(0k0)$ spectra. The latter parameters are not yet determined with sufficient accuracy, owing to overlapping in the (100) projection, to justify reporting of interatomic distances. At this stage of the analysis the molecule appears to be planar, with the plane inclined about 63°

Table 1. Atomic coordinates for azulene.

Atom	x/a	y/b	z/c
C_1	0.033_5	0.09	0.760
C_2	0.134_5	0.29	0.819
C_3	0.153	0.45	0.700
C_4	0.039	0.47	0.387
C_5	-0.060	0.41	0.212
C_6	-0.136	0.21	0.186
C_7	-0.171_5	0.03	0.281
C_8	-0.106	0.02	0.462
C_9	-0.009_5	0.15	0.581
C_{10}	0.060	0.35	0.530

to the (010) plane. The general scheme of the crystal structure is similar to that of naphthalene (*4*). The shortest distance between atoms in neighboring molecules is 3.6_1 A. Details of the molecular configuration require a three-dimensional analysis. This is in progress.

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9 February 1956

International Relations in Science and Problems of Visas

In this brief report I wish to relate factually the events of the failure to bring to the United States a distinguished French astronomer for a conference 3–5 April 1956 that was sponsored by the National Science Foundation and the Leander McCormick Observatory of the University of Virginia.

On 3 May 1955, the steering committee of the conference drew up a list of twenty specialists in the field of cosmic distance determination. Daniel Chalonge of the Institut d'Astrophysique, Paris, France, eminently qualified in this field, was included in the list. Since Chalonge on a previous occasion had had difficulties in obtaining a visa, it was thought advisable to make inquiries with the State Department before inviting him. This was done through the Office of the Division of International Relations of the National Academy–National Research Council, the channel through which scientists handle matters of this type. In a letter dated 21 June 1955 to the division, I stated, "Before inviting Dr. Chalonge to take part in this conference I am anxious to learn the attitude of the State Department in view of the past history of the case. I do not wish to embarass him, our government nor ourselves. I understand the difficulties of the situation. We may be told that the case cannot be considered until he applies for a visa but I am afraid this will not solve the problem." The letter also included a long paragraph relating to the history of the previous failure as far as known to me. Early in August 1955, while I was in Oslo attending a meeting of the International Council of Scientific Unions, I was informed verbally by a member of the staff of the Science Advisor to the State Department, and in the presence of the other members of the American delegation, that on the basis of information he had received, I should proceed to invite Chalonge. With this assurance we extended the invitation late in August 1955, during the meeting of the International Astronomical Union in Dublin, Ireland.

I know that Chalonge spent much time during the succeeding months preparing for his visit to the United States, which was to include colloquium lectures at eight astronomical centers in the eastern United States following the Virginia conference. I understand that Madame Chalonge visited the U.S. Consulate in December 1955 and that she was informed that they had plenty of time for application for the visa. In January 1956 they applied and planned to sail on 22 March. Since by the middle of February they had received no reply, I wrote to the office of the Science Advisor on 22 February. The reply stated "Apparently Dr. Chalonge applied for his visa only recently. If he had followed the suggestion that I passed along to you, and you to him, last August of applying for his visa promptly, he probably would not have had any current worries." Here some misunderstanding must have occurred, for I do not recall being instructed of "prompt application," and the Paris Consulate did not indicate its need. On 2 March, I telephoned the Office of International Relations of the Academy and after they had consulted the State Department, they informed me that there were no complications and that the visa would be issued. On 12 March I telephoned again and I was told that the matter was being taken up with the Attorney General and that it would take a week or at the most 10 days for processing the case but I could rest assured that the action would be favorable. I advised Chalonge accordingly and suggested that he change the time of his departure to 29 March which I knew beforehand it was possible to do.

On the evening of 28 March, the day before his planned sailing, the U.S. Consulate informed him that since he is a member of the French-USSR Cultural Society, which under the American law is considered a communistic group, his visa could not be issued for more than three days, the duration of the conference. Under these conditions Chalonge refused the visa and wrote as follows.

"Dans ces conditions, je n'ai pas cru pouvoir accepter le visa car il était un peu humiliant pour moi d'être ainsi sous le contrôle de la police, comme un malfaiteur.

"J'ai pris cette décision avec beaucoup de peine en pensant aux efforts qu'ont fait mes amis américains pour me faire venir."

It is unfortunate that Chalonge felt that his limited visa implied police control. To be notified only at the very last moment of departure and be told that he is permitted to stay in the United States for 3 days only seems most unreasonable.

All this is, of course, regrettable for all parties concerned, including the State Department and the Attorney General's office.

In conclusion, I wish to emphasize that the aim of this report is to give all the facts as I know them with the hope that they might contribute in remedying a situation which is detrimental to science and our international relations.

Last August at the International Astronomical Union Meeting in Dublin, the American Delegation was authorized to extend, on behalf of the U.S. Government, an invitation to the union to hold its 1961 General Assembly in the United States. If such a meeting takes place, some 400 foreign astronomers may be coming. It seems obvious that under existing conditions careful consideration of this problem is needed, and before our General Assembly in 1958.

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22 June 1956

Neoplastic Changes Developing in Epithelial Cell Lines Derived from Normal Persons

That animal fibroblasts grown continuously in tissue culture can develop the ability to produce tumors considered histopathologically as sarcomas has been demonstrated on numerous occasions (*1*). The present report concerns the acquisition of a similar ability by four strains of human epithelial cells which