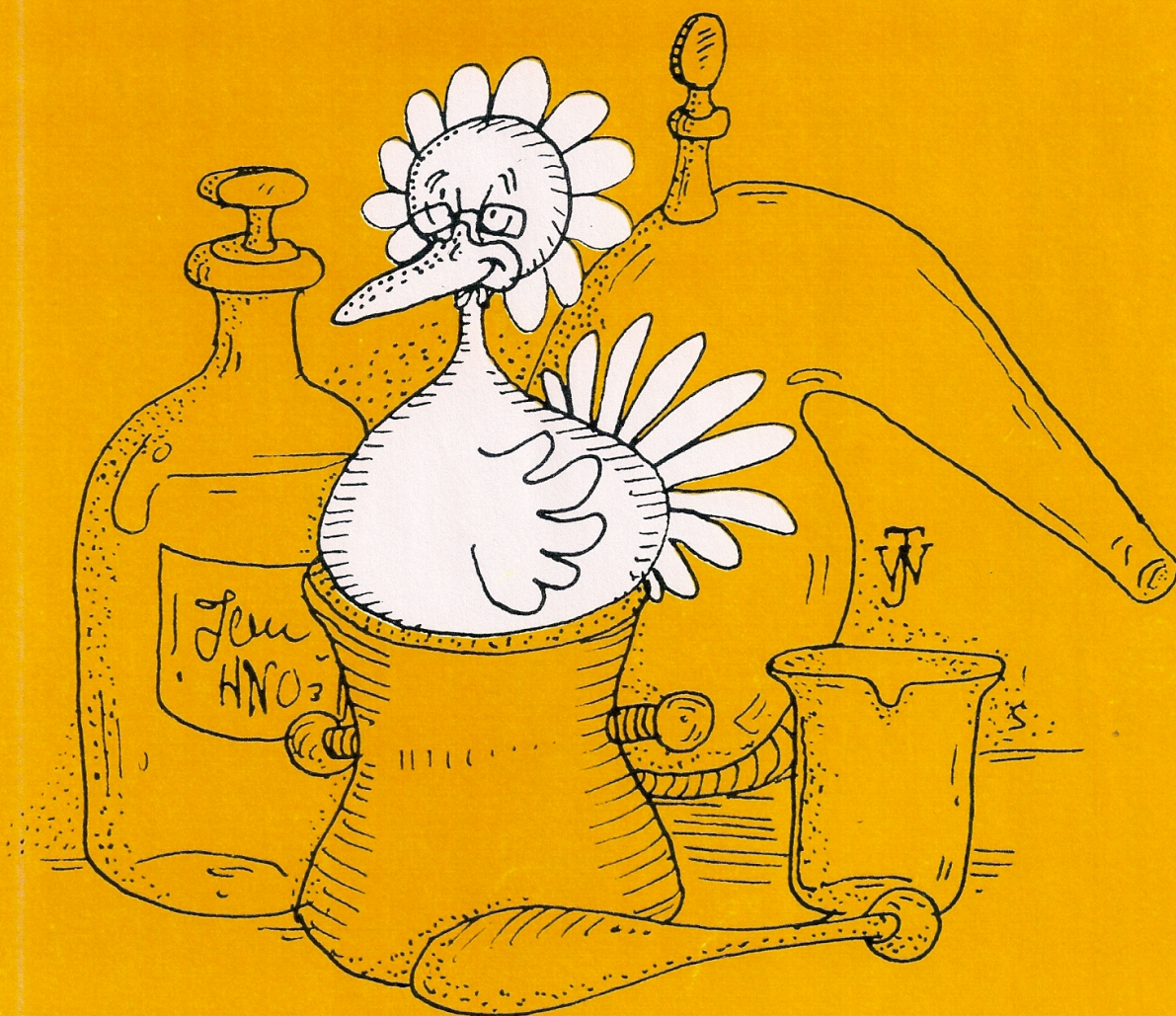
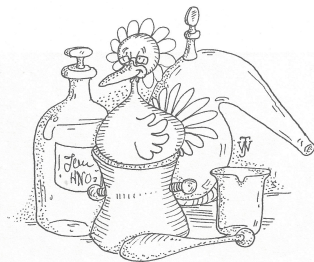


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Chemistry

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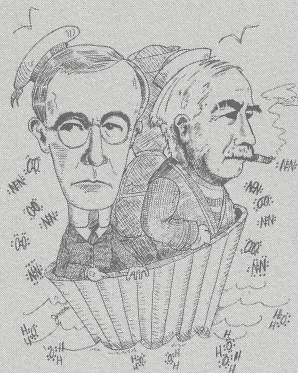
A Chemist's Annotated Mother Goose of Modern Bonding Theory

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Dalton and chemistry,
Attraction and affinity;
Davy and Berzelius,
Charges and Arrhenius;
Couper and A. Kekulé;
Electrons and old J.J.;
Van't Hoff and 3-D,
Werner and valency;
Alas we could give rhymes galore,
But we do not wish to Bohr. (1)

A short history of
bonding theory from
1800-1906

Rub a dub dub,
Three men in a tub;
Lewis, Langmuir, Kossel—not four.
The electrons will pair,
For each atom to share,
Save ions, which need no more. (1)



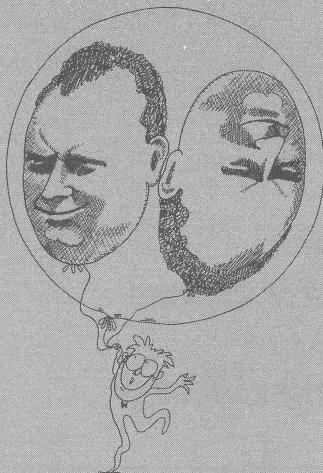
Walther Kossel (standing with his back to us) developed an electronic theory of valence independently of Lewis and Langmuir

Hey diddle diddle!
With waves from a fiddle,
DeBroglie our physics did save;
And Schrödinger affirms,
With differential-like terms,
That matter is really a wave. (2)



Though electrons are not literally considered waves by most physicists and chemists today, this was definitely Schrödinger's original interpretation

A play on the symbol
for paired electrons



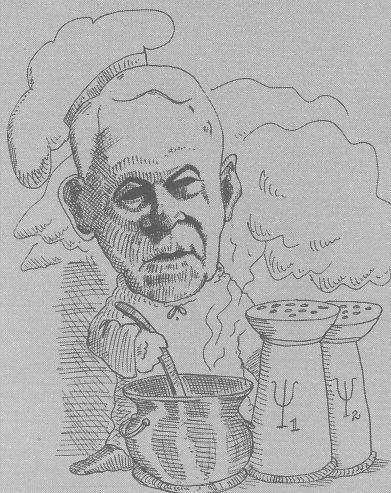
Pauli, Pauli, quite contrary,
How do your spins arrange?
"Opposites together,
But identicals never,
A phenomenon very strange." (2)

Pauling as a resonating
 π electron in the con-
jugated $\text{---C=C---C=C---C=C---}$
system. The phrase
"dialectic suspicion"
refers to Russian
attacks on resonance
theory. "Hints for the
Perplexed" refers the
reader to translations
of some of these
attacks



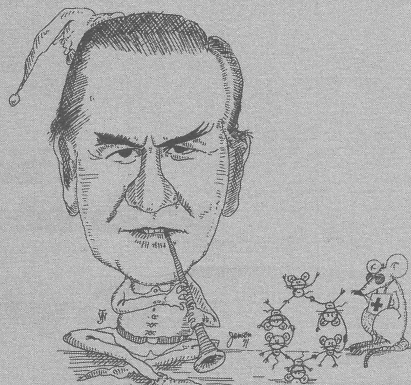
See-saw,
Pauling et al.,
Resonance in every position;
The electron is there,
But also elsewhere,
I have a dialectic suspicion. (3)

The phrase "ortho-
gonally brewing" is used
in a contrary sense,
as the necessary re-
quirement for making
a molecular orbital
(M.O.) from two
atomic orbitals (A.O.'s)
is that the A.O.'s be
not orthogonal



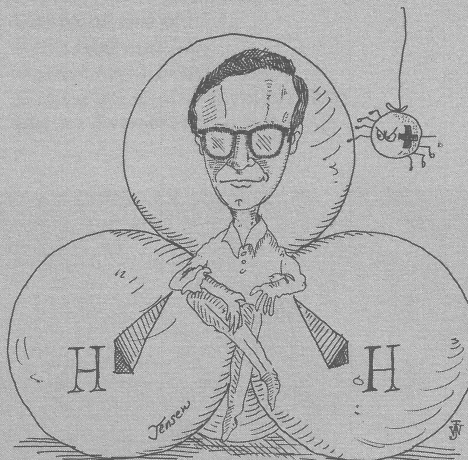
Mulliken, Mulliken,
What are you doing?
"M.O.'s from A.O.'s,
I'm orthogonally brewing.
"Pi bonds, sigma bonds,
Symmetric or not;
Excited or ground state,
That's what I've got.
"I have psi's and phi's,
And pi's galore,
And with linear combinations,
Several millions more." (4)

Three extra electrons!
See how they correlate!
They all formed into a bond by Linnett,
Where their close-paired positions were all
upset,
The problem of resonance they conquered
and met;
Those three extra electrons. (5)



A blending of the themes of the Pied Piper of Hamelin and the Three Blind Mice. Linnett is pictured as the piper and the mice as forming a Linnett triple bond in the presence of a blind rat who is acting as a positive kernel

Little Henry Bent,
Sits in the dent,
At the center of tangent spheres,
In fermions close packed,
And electrostatically stacked;
As the neighboring nucleus leers. (6)



The line "as the neighboring nucleus leers" refers to the fact that in Bent's theory bond-lengthening and angle-widening effects are due to nucleus-nucleus or kernel-kernel repulsions. Hence the antagonistic glare of the spider nucleus directed at Dr. Bent. The rhyme is also a play on Little Miss Muffet

Hints for the Perplexed

- (1) Benfey, O. T., "Classics in the Theory of Chemical Combination," Dover Publications, New York, NY, 1963.
- (2) Cline, B. L., "Men Who Made a New Physics," Signet Science Library, New York, NY, 1969.
- (3) Kursanov, D. N., et al., "The Present State of the Chemical Structural Theory," *J. Chem. Educ.*, 1952 29 (1) 2; Tatevskii, V. M., Shakhparanov, M. I., "About a Machistic Theory in Chemistry and Its Propagandists," *ibid.*, 13.
- (4) *Chemistry*, 1967, 40 (1), 26-27; Ferreira, R., *ibid.*, 1968, 41 (6), 8-15.
- (5) Zuffanti, S., "Electron Repulsion Theory," *ibid.*, 1970, 43 (5), 8-13.
- (6) Bent, Henry A., "The Tetrahedral Atom II," *ibid.*, 1967, 40 (1), 8-15.

WILLIAM B. JENSEN, whose drawings of famous chemists have illustrated several Chemistry articles, is a graduate student at the University of Wisconsin and a member of Phi Lambda Upsilon Honorary Chemical Society. He is interested in chemical curriculum and instruction and is currently working for his master's degree.

