Notre Dame Journal of Formal Logic
Volume XII, Number 1, January 1971

ATOMISTIC MEREOLOGY I

BOLESŁAW SOBOCIŃSKI

In Leśniewski's mereology the existence of the mereological atoms cannot be proved without an addition of some new axioms to the original axiom system of mereology. The strongest form of the possible axioms concerning the existence of mereological atoms in the field of mereology is an assumption which implies that every object A is either a mereological atom or a mereological class constructed from the atoms which are the mereological elements of A. I shall call an extension of mereology obtained by adding the above assumption, as a new axiom, to the axiom system of mereology, atomistic mereology. On the other hand it is possible to construct an entirely different extension of mereology by adding an assumption that no atom exists in the field of mereology. Such a system which is called the atomless mereology will not be discussed in this paper. Up to now these two extreme extensions of mereology which, obviously, are mutually incompatible were investigated very little. Only, in a still unpublished part of his doctoral thesis, *cf.* [5], chapter II, sections 1 and 2, pp. 72-100, Clay has established several metatheorems about general properties of these two ramifications of mereology. In [5], p. 83, Clay has remarked that since there is no mereological zero element, i.e. an element which would correspond to Boolean algebraic zero element, in mereology, the definition of an atom in the latter system is more simple than it is in Boolean algebra. And, using mereological functor "**pr**" he defined a notion of a mereological atom, as follows:

CD1 $[A]: A \varepsilon A \,.\, [B] .\sim (B \varepsilon \mathbf{pr}\,(A)) .\equiv . A \,\varepsilon \mathbf{atm}$

But, although in [5] he has proved several metamereological theorems concerning atomistic mereology, Clay did not axiomatize this system. Recently, in connection with his investigations which are not yet published concerning a certain geometrical system, V. F. Rickey observed that the axiomatized atomistic mereology would be very useful for this research. Consequently, he defined an atom using the mereological functor "**el**" in the field of mereology, as follows:

RD1 $[A] .\therefore A \varepsilon A : [B] : B \varepsilon \mathbf{el}(A) . \supset . B = A :\equiv . A \varepsilon \mathbf{atm}$

Received January 11, 1970