

partially silicified specimens a solution of weak, slow-acting acetic acid is used. Formic acid has recently been used to etch fossil insects of Miocene age from calcareous nodules found in the Calico Mountains near Yermo, California (see U.S. Geological Survey Professional Paper 294-G).

High-frequency vibrations introduced into a liquid-filled tank have been employed to clean paleontological material. This results in a lowering of surface tension on the surface of the adhering particles and accelerates chemical and physical breakdown of the adherence bonds. Such devices have proved most useful in cleaning extremely small fossils (microfossils) but they are also effective with larger fossils when the matrix is fine-grained and is compacted rather than cemented. The cost and specialized uses of such devices makes them impractical tools for the average collector.

Another method of breaking down the well-compacted, fine-grained matrices involves the use of a solvent such as gasoline, kerosene, or alcohol. The fossiliferous material is thoroughly saturated with the solvent, then dried. During this process, some shales and mudstones will fall apart; others require boiling with water and a wetting agent.

#### Preservation

After cleaning, some fossils are ready to be identified and studied, stored, or exhibited, but many require some further treatment. Very fragile, porous specimens may be soaked in a thin alvar-acetone solution. Somewhat sturdier specimens can be dipped in or painted with shellac well thinned by alcohol. This makes fragile material more resilient and provides a more dust-free surface. The most common technique of repairing fossils is that of simply gluing the parts of a broken specimen back together. A fast-drying amberoid or duco-type glue is suitable.

### Identification

#### What is it?

Proper identification is time consuming. If the material is without locality data it is hardly worth spending the time to identify it. Anyone planning to make a hobby of fossils should become acquainted with the literature in which the name assigned to the fossil can be discovered. The same literature recommended for use in finding field localities also will prove useful in identification. Some such works are included in the bibliography along with two basic text-books on paleontology in which scientific terms are defined. A basic text-book also will aid in determining to which group a fossil belongs. Identifications will become increasingly accurate with experience.

Specimens that have been described and illustrated are preserved in the collections of museums and universities. These research collections are not always open to the general public, but are often made available to anyone whose knowledge and interest warrant it and whose project requires it. Usually the comparison of one's own material with the research collections of such institutions provides a final check on identification.

Not all fossils have been described, and there is always the possibility of discovering something new. The description of a new species requires much more checking and comparing than does the identification of a species already described. Rules governing the description of a new form can be found in "Procedures in Taxonomy" (see bibliography under Schenck and McMasters).

#### A look at names

Before Linnaeus there was no standard nomenclature. Often the names devised by naturalists were really brief Latin descriptions. However brief, though, descriptions make cumbersome names, and naturalists found the binary or binominal system of Linnaeus much more concise. From this has evolved

the present binominal system, based on the rules of the International Commission on Zoological Nomenclature. Zoological names usually consist of two italicized names plus the author's name.

<i>Submorticeras</i>	<i>chicoensis</i>	(Trask)
generic name	specific name	name of the author who first described the fossil.

The *generic name* always begins with a capital. It is used to refer to species which have certain characteristics in common. For each genus there is a "type species", that is, a designated species which exhibits these characteristics. Some genera have had only one species thus far assigned to them; but most genera consist of a number of species which are considered to be related.

The *specific name* usually is not capitalized. A species is based upon the characters exhibited by a particular individual specimen, the holotype. All specimens that can be shown to be sufficiently like the holotype will be included in that species. The species may be moved from one genus to another but the specific name remains the same. In the above example the name *chicoensis* was first applied to the species by J.B. Trask in 1856. He called it *Ammonites chicoensis*; that is, an ammonite from Chico (-ensis, is a suffix, meaning place). As the classification of ammonites has been refined, the species *chicoensis* Trask has been moved from genus to genus, becoming successively [*Ammonites*]; in paleontologic literature such brackets commonly indicate a name used in the past but not now considered appropriate by a given worker.

The *author's name* is included to make doubly sure that we are all considering the same group of animals. This will always be the name of the person who first described the species. It is common practice to put the author's name in parenthesis if the species has been removed from the genus in which it was originally described. This is a signal to anyone looking up this species that he must search under more than one generic name.

#### Storage

##### Keep it clean

The problem of storage is an initial concern solved by each collector in his own way, but certain basic requirements exist. Cases should afford ready access and provide some measure of protection from dust. Tiers of closed-in drawers are a common mode of storage. Simple, open racks into which trays may be slid are inexpensive but afford less protection. Glass cases are an attractive means of displaying specimens; however, they generally require more space and are more expensive. Figure 5 shows a common type of storage.

##### Keep a record

Labels should serve not only to identify fossils but also to tie them to a carefully kept record. This should make inadvertent mixing correctable.

In keeping a record, one has a wide choice of methods. A card file or catalog will serve the purpose and it may prove advantageous to use a combination of the two to relate separate systems of data. For example, an arbitrary series of numbers might be assigned to localities and entered consecutively in a catalog of locality descriptions. In contrast, individual specimens will probably be stored according to biological group and/or according to age. To relate or unify these systems the locality numbers and possibly a brief statement of locality should be entered on the file cards and labels. In addition the locality number should be placed on each specimen so that it will always have an identifying mark should the specimen ever be misplaced.

Marking fossils is simple. Small dots or punchings of paper are commonly used, the locality number being printed thereon with india ink. Some collectors prefer small spots of paint. One