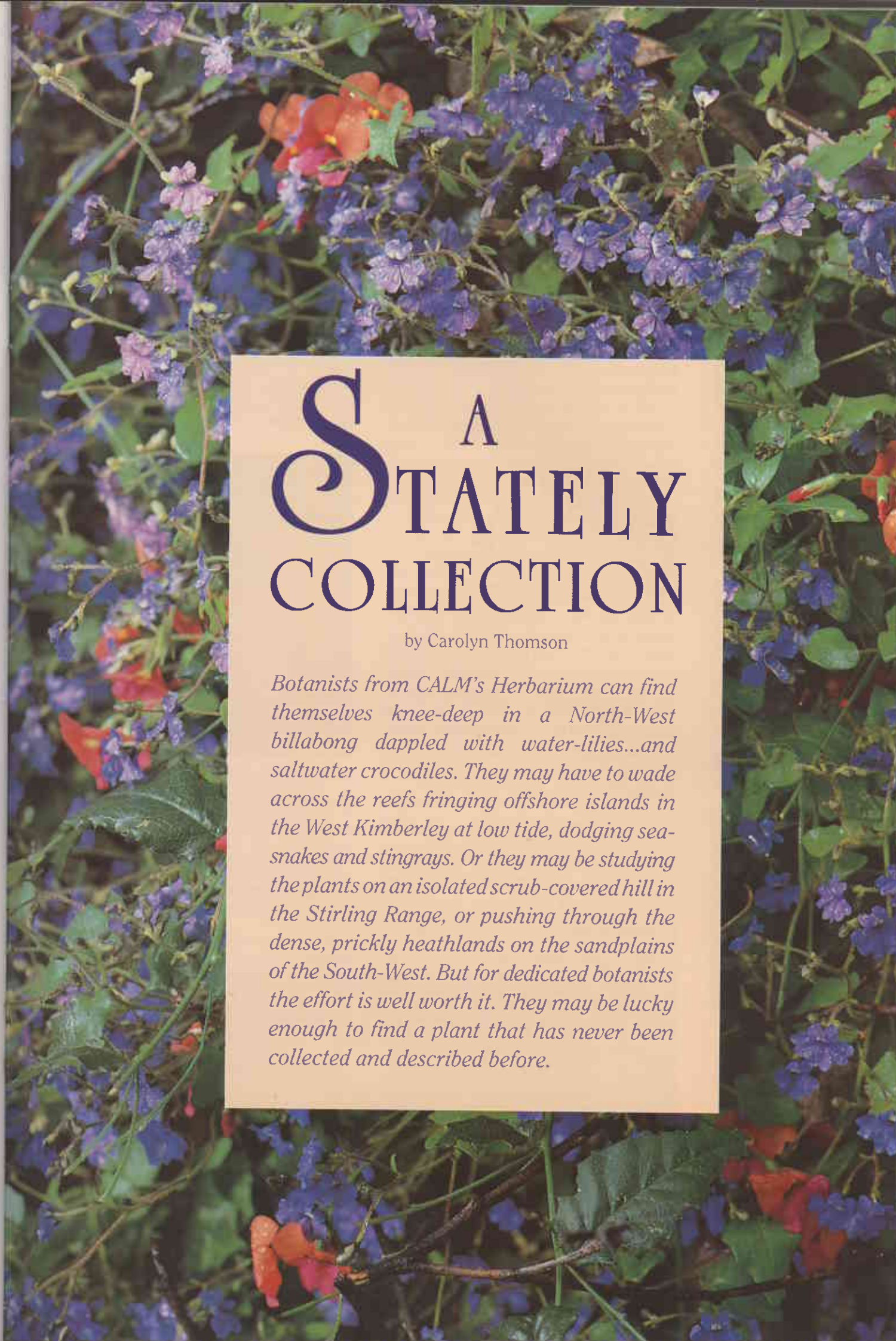


A STATELY COLLECTION

by Carolyn Thomson

Botanists from CALM's Herbarium can find themselves knee-deep in a North-West billabong dappled with water-lilies...and saltwater crocodiles. They may have to wade across the reefs fringing offshore islands in the West Kimberley at low tide, dodging sea-snakes and stingrays. Or they may be studying the plants on an isolated scrub-covered hill in the Stirling Range, or pushing through the dense, prickly heathlands on the sandplains of the South-West. But for dedicated botanists the effort is well worth it. They may be lucky enough to find a plant that has never been collected and described before.

From top: red boronia *(Boronia heterophylla)*; *Diplopeltis stuartii*; bush pomegranate *(Balaustion microphyllum)*; and Albany pitcher plant *(Cephalotus follicularis)*.
Photos - Michael Morcombe

THE more mundane work of mounting specimens and classifying plants is just as vital, as it too contributes to the huge task of documenting and managing the extensive flora of the State.

The hub of these activities is the Western Australian Herbarium in Kensington, where rows of steel shelves house over 400 000 pressed and dried plant specimens. Here, botanists can be found identifying, naming, classifying, curating and generally probing into WA flora, much of it unique to the State and quite a bit of it still poorly known and unstudied.

Along with the extensive research collection, the Herbarium contains a Community Reference Herbarium, the State's botanical library and a huge computerised database that will eventually store readily accessible information on the entire Herbarium collection. There are also regional herbaria in Albany, Manjimup and Karratha as well as 55 field herbaria in national parks, reserves and CALM's regional and district offices.

DISCOVERY AND GROWTH

The discovery of the Australian continent created great excitement in botanic circles. Since 1699 a host of visiting botanists and explorers have collected Western Australian plants, including William Dampier, Robert Brown (the botanist on Matthew Flinder's voyage), James Drummond and Ludwig Preiss. Most of these historic specimens found their way into vast collections in herbaria in Berlin, Geneva, Paris, London, Florence, Kiev and other parts of Europe.

It wasn't until the 1890s that official herbaria were established in the State, in the newly formed Museum and in the Department of Agriculture. The latter appointed a botanist and began a collection of economically important plants. In 1916 the Forests Department established a herbarium for species from South-West forests. However, the unique character of Western Australia's flora attracted world-wide interest and the State needed a single herbarium recognised by the herbaria of the world.

The decision was made in 1928 to merge the three herbaria into a single State Herbarium. The amalgamation was finally completed in 1959 when the Museum collection was transferred on permanent loan to the Herbarium in the Department of Agriculture.

The whole Herbarium was transferred in 1988 to the Department of Conservation and Land Management (CALM) to form a vital arm of its Research Division. Along with its expanded role in CALM, the Herbarium also has a new

Pink-flowering *Isopogon latifolius* is confined to the upper peaks of the Stirling Ranges. It was described in 1830 by Robert Brown, the botanist on the Matthew Flinders expedition.
Photo - Michael Morcombe ▲

Large hibbertia *(Hibbertia lasiopus)* is common in the gravel soils of the jarrah forest.
Photo - Michael Morcombe ▼

Curator, Jim Armstrong, formerly the Assistant Director of the Australian National Botanic Garden in Canberra.

MANAGING FLORA

The Herbarium aims to provide a system of internationally accepted names for the estimated 11 000 plant species found in WA. Of these, about 8 000 species are currently described and a further 3 000 are recognised yet have no scientific names. About 800 exotic species are naturalised in WA. Without the Herbarium to provide information on the characteristics, habitat and distribution of the State's species, managing flora in natural areas would be difficult.

The Herbarium's work is vital to CALM. If plants are reliably named and can be identified, then information about their biology can be stored and retrieved. For example, information on how plants cope with fire is of particular use for land managers. CALM also needs botanical information on the State's rare flora in order to manage and conserve it.

Because of its origin in the Department of Agriculture, the Herbarium has always played an important role in identifying poisonous and other problem plants. For example, in some areas of the State the introduced prickly pear threatens agriculture and it is hard to eradicate when established.

But some varieties are more damaging than others, and that's where the Herbarium comes in. The Department of Agriculture collects samples in the field and the Herbarium's identification will show whether or not an infestation must be destroyed. Similarly, all agricultural weeds and naturalised plants in reserves and national parks must be identified accurately before the Herbarium can give advice on their control.

TERMITES AND HELICOPTERS

The task of collecting WA's flora takes the Herbarium's botanists to some of the most isolated and far-flung parts of the State. At the moment a major project is to document the flora of the Kimberley, which until recently was largely uncharted botanical territory. They might work in luxuriant Kimberley rainforests, with orchids festooning the branches, or in the dry and highly dissected Edgar Ranges at the top of the Great Sandy Desert, south-west of Broome.

Collecting techniques in these parts have to be adapted to the region's special conditions. A lot of rainforest trees and tall eucalypts in the North-West, for example, are heavily "piped out" by termites and are too dangerous to climb, so botanists have to use a gun to shoot the flowering branches off the tree to obtain specimens.

Then there are the hazards, which amount to more than just the crocodiles. Kevin Kenneally described an occasion when he and fellow botanist Bruce Maslin were collecting specimens on the Mitchell Plateau when a cyclone suddenly developed.

"The rain was so heavy we could not see. We had to take refuge in a cave while we waited for the helicopter that had dropped us off to come and collect us. Fortunately the pilot made it through, but because of poor visibility we had to land four times on the way back," he said.

The Mitchell Plateau Falls during a collecting expedition in 1982; 400 mm of rain fell in only 48 hours due to Cyclone Bruno.
Photo - Kevin Kenneally ▼

Botanist Kevin Kenneally had to shelter in a rock cave on the Mitchell Plateau, after Cyclone Bruno developed during a collecting expedition in January 1982.
Photo - Bruce Maslin ▶

From top: illyarrie *(Eucalyptus erythrocorys)*; Sturt's desert pea *(Clianthus formosus)*; lemon-scented darwinia *(Darwinia citriodora)*; and native bee on *Boronia gracilipes*.
Photos - Jiri Lochman

From top: flying duck orchid *(Paracaleana nigrita)*; scarlet banksia *(Banksia coccinea)*; jewel beetles feeding on *Melaleuca* flower; and native bee on wild tomato *(Solanum sp.)*.
Photos - Jiri Lochman

Much Herbarium collecting is done in the plant-rich South-West of Western Australia, one of the richest botanical areas of the world, noted especially for the number of woody shrub species. The Stirling Range, for example, or the Mount Lesueur area (*Landscope*, Winter 1989), have yet to reveal all their botanical treasures. New species and new localities for plants, many of which may be rare, are recorded on almost every field trip.

SPECIMENS

Dried and liquid preserved specimens form the basis for botanical studies on the naming and classification of plants. When properly prepared, they retain the features needed for their accurate identification. When a plant is collected in the field, the locality, latitude and longitude and habitat information is recorded in a field book. Individual plants always grow in identifiable plant groups or communities, so it is also important to record the plant's habitat.

When the specimen arrives at the Herbarium it must be thoroughly dried, then frozen at sub-zero temperature for several days to kill insects. Insects could wipe out decades of work, so it is also necessary to fumigate the building regularly. The specimen is mounted on a stiff sheet with the accompanying habitat details, and the task of incorporating it into the collection commences. Each of the Herbarium's 400 000 specimens is filed according to a system of classification that reflects its relationships.

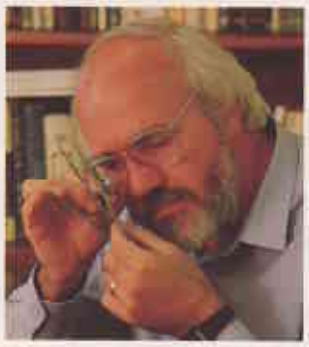
Most of the collection is of flowering plant species. But the Herbarium also has separate collections of Western Australian fungi, mosses and liverworts and a large collection of lichens and marine and freshwater algae.

NAMING

Research carried out at the Herbarium often results in discoveries, and in the last decade Herbarium staff named more than 300 new plant species.

The scientific naming of plants is governed by a set of rules established by an international committee. Each new species must be described in Latin and published in an appropriate scientific journal. The name can commemorate the plant's discoverer or some other person, relate to its geographical region, or describe an interesting feature of the plant.

New Curator, Jim Armstrong, wants to increase the Herbarium's public profile.
Photo - Wilf Hendriks ▼



When it is formally described, the botanist must designate one Herbarium specimen from among those studied as the Type of the species. This "Type Specimen" assumes special importance - it becomes the physical reference point for the new name.

TAKING PLANTS TO THE PEOPLE

Jim Armstrong is keen to enhance the Herbarium's profile, to let the public know what it does and how important its work is.

Publications are one approach. A two-volume *Flora of the Perth Region* was published in 1987; it describes 2057 species and retails for $47.00. *The Flora of the Kimberley Region* should be published by 1991. The Herbarium will eventually produce a series of publications on the flora of most of the State's regions. A range of research publications and journals, including *Kingia* and *Nuytsia*, are also produced.

CALM's Suzanne Curry collecting a Type specimen from an *Acacia* on Landor Station, on the Gascoyne River.
Photo - Bruce Maslin ▲

Plants grow in identifiable plant communities. This jarrah forest understorey contains white myrtle, coral vine and zamias.
Photo - Michael Morcombe ◄

Members of the public who wish to identify their own specimens can use the Community Reference Herbarium. With representative specimens of two thirds of the State's flora, it is an important resource for use in identifying and obtaining information on the native and naturalised plants of WA. To identify a plant using the Community Reference Herbarium, you would need to bring your specimen to the Herbarium and compare it with those in the reference collection.

However, to ensure the security of the collection, Herbarium staff must treat all incoming specimens for insects before they can be taken into the building. Enquire at the front office. If the collection is less than 9 cm thick it can be treated immediately in a microwave oven. Otherwise, arrangements need to be made in advance.

A reference library is located with the Community Reference Herbarium. It has many helpful botanical works to assist users to identify their specimens. The Herbarium is open from 8.30 am to 4.30 pm on weekdays.

COLLECTIONS

The Herbarium's 400 000 plant specimens have a replacement value of $15 million!

There are two major collections. The vascular collection (flowering plants, ferns and their allies, and cone-bearing plants) is mounted on stiff sheets of paper for storage, whereas the non-vascular collections (mosses and their relatives, algae, fungi and lichens) are mostly placed in special packets.

The entire collection is named and arranged according to a standard classification system that groups related plants. Using such a system, specimens of any particular species can be quickly located and the label information on it retrieved by researchers.

Many of the 12 000 plant specimens added to the Herbarium each year are collected by Herbarium staff and other research staff in CALM. Duplicate material of the specimens is used by the Herbarium to exchange with other herbaria throughout the world and to acquire additional specimens for the collection.

Properly conserved and maintained, the Herbarium collections are an increasingly valuable permanent record of the State's vanishing spectrum of plant life.

From top: teasel banksia *(Banksia pulchella)*; blue pincushion flower *(Brunonia australis)*; native bee on pigface *(Carpobrotus sp.)*; and Albany bottlebrush *(Callistemon speciosus)*.
Photos - Jiri Lochman

From top: a sundew *(Drosera indica)*; *Cassia venusta*; *Guichenotia macrantha*; and wild honeysuckle *(Lambertia ericifolia)*.
Photos - Jiri Lochman

One seed of the deadly crab-eyes *(Abrus precatorius)* will kill an adult. It is found throughout the tropics and the seeds were used for decorations by some Aboriginal tribes.
Photo - Michael Morcombe ▲

NEW HORIZONS

WA is one of the last frontiers of botanical studies. Despite the huge number of specimens housed at the Herbarium, there is still much to find out. New plants are being discovered all the time.

"We still know very little about the flora of this State," says Jim Armstrong. He points out that the National Herbarium of NSW has more than a million specimens for an area representing a third of the size of WA.

"Every time we take a close look at a group it results in a 40 to 50 per cent increase in the number of named species, subspecies and varieties (taxa). For example, 150 new taxa of eucalypts have been discovered in the last decade.

"Least is known about the marine flora of the State," says Jim. "There are flowering plants in the sea with bizarre reproductive systems - they are actually pollinated by water. Understanding the State's marine flora is becoming increasingly relevant with the establishment of marine parks."

LOOKING TO THE FUTURE

As well as its vital role in flora management, the Herbarium also provides an indispensable public service. Many people rely on the Herbarium to determine the identity of botanical materials, including investigators from a variety of scientific fields and land-use professionals who prepare environmental impact reports or planning documents.

Graham Donation collecting gubinge fruit from coastal rainforest near Broome. The Herbarium is documenting Aboriginal uses of plants in the region.
Photo - Kevin Kenneally ▼

The collection is also used by visiting researchers from other institutions. Working space is provided for the 20 to 30 interstate and overseas botanists who visit WA each year. Specimens are routinely loaned to other botanical institutions for study and in 1988 more than 8 000 specimens were loaned to herbaria throughout the world.

Jim summed up the Herbarium's role succinctly: "I see it as a museum with a difference - it's the centre for botanical research in Western Australia and the heart of flora conservation research in CALM."⊡

LANDSCOPE

VOLUME FIVE NO 1 SPRING EDITION 1989

Perth people were devastated when a fire tore through their favourite bushland retreat. But, with Spring, new life and colour is returning.

Rottnest isn't the only unspoilt island on Perth's doorstep- what about Penguin, Garden, Seal and Carnac Islands? They are steeped in history and provide a haven for some unique wildlife.

Algae has clogged the estuaries near Mandurah, killing fish and creating an eyesore. What is the solution?

Jarrah dieback- the word strikes fear into any forester's heart- but research is fuelling the fight against the killer fungus.

Explore the waterways of the South-West by canoe.

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C O V E R

*What's new in Kings Park this spring? Artist, Susan Tingay, couldn't resist this magnificent collection of spring orchids. From left- cowslip orchid (*Caladenia flava*), jug orchid (*Pterostylis recurva*), King spider orchid (*Caladenia huegelii*), donkey orchid (*Diuris longifolia*), rabbit orchid (*Caladenia menziesii*), and pink fairy orchid (*Caladenia latifolia*).*
*Back Cover: Stimson's python (*Morelia stimsoni*)*
Photo-Jiri Lochman

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