

Scalation in Goldfish

The old adage that there are three types of scales which occur in goldfish seems to be coming under a great deal of criticism. Rest assured that the metallic, nacreous and matte scale types still exist. This article will provide insight into scale types, and new variations in the types of scales that are found in goldfish.

Metallic Scales

Perhaps the most common type of scalation seen in goldfish is metallic. Metallic scales are flashy and attractive. Most people observing goldfish for the first time are attracted by the reflective nature of metallic scales. Metallic scales are opaque (that is, they do not transmit light through them), and contain a layer of reflective material, called guanine just under the epidermis, or skin layer. Sometimes, small quantities of guanine can be found in the skin layer as well, adding a further reflective quality to the appearance of the fish.



Common goldfish, exhibiting metallic scales

Recently, metallic fish have appeared in the U.S. which exhibit variegated patterns of color, somewhat similar to “calico” fish. These fish, which have been common in Japan and China, have appeared within the last ten years in greater quantities in the U.S., and have led to confusion among hobbyists who often term these fish “calico.” True calico fish have nacreous scales, which are defined below.



Metallic multi-colored fish

Matte Scales

Scales which lack a layer of guanine are termed Matte scales. Since the reflective material in guanine is not present, the scales are semi-transparent and allow some light to pass through them. While guanine is not present in the body of the scale, it may be present at the edges of the scale. It is also possible that guanine is present in the skin, although not present in the scale. Matte scales can be represented by several possible combinations, as summarized in the table below.

Description	Guanine in scale	Guanine at edge of scale	Guanine in skin layer
Pure Matte Fish	N	N	N
Netlike transparent scale/blue belly	N	Y	Y
Mock Metallic	Y	N	Y

The presence or absence of guanine in the scale can be expressed at the edge of the scale and in the skin layer, which produces the netlike transparent or blue belly fish. Blue belly fish were originally named because the lack of guanine in the scale

caused the gills and other internal organs of the fish to be seen through the body of the fish. The internal organs, resident in the belly, can sometimes be seen, and when they are seen, appear blue, hence the name.

The presence of guanine within the body of the scale, but not at the edges, and within the skin layer leads to the mock metallic variant of goldfish. Mock metallic fish often exhibit the gill structure, since guanine is often absent near the head and opercular region of the fish. Pictures of the three types of matte scaled fish are shown below.



Matte goldfish with “Bristol” tail form - note that guanine is lacking throughout the body of the fish



Mock metallic common goldfish - note presence of guanine at the edges of the scales



Blue belly fish with "Bristol" tail form

Nacreous Scales

Fish which possess a combination of metallic and matte scales scattered at random over the body of the fish are termed nacreous fish. Technically, only a

nacreous-scaled fish can be described as being “calico,” since the term is derived from the Japanese translation meaning “brocaded” or “spangled” fish. The “brocading” and “spangling” refer to the presence of metallic scales which are arranged in a random manner throughout the body of the fish.



Bristol Shubunkin, exhibiting calico scalation and color



Calico Ryukin