

Introduction

Real living systems are incredibly complex. Your DNA contains the instructions for synthesising the amino acids necessary to construct the proteins that eventually make your cells—all ten trillion of them. You have around 100,000 genes, or instructions, and each of the cells in your body carries a complete copy of them. Your genes code for *structure* rather than specific behaviour. There is no gene that allows you to walk to work, for example. This is something that emerges from the systems created from your DNA. Whilst in Creatures it has not been possible to model genetics at a protein level, we have stayed true to the principle of genetics—in that we code for structure, not behaviour.

The Creatures system consists predominantly of three parts, all of which are genetically specified, and subject to mutation over generations:

- **Biochemistry.** As life is dependent on reactions in a soup of complex chemicals, Creatures contains a biochemistry modelling system. This is used throughout a creature to handle a wide variety of systems, such as the digestive, reproductive and immune systems as well as providing the vital structure for creature learning. These systems are contained within organs in the creature's body.
- **Brain.** The control centre of animals is the brain, a collection of neurone cells arranged in “networks” out of which intelligence (and in the case of humans, consciousness too) emerges. Neurones “learn” by strengthening or weakening their connections as a result of chemical feedback. Creatures has a brain model inspired by real biological brains.
- **Morphological and Creature features.** Creatures are bipedal, and because their individual body parts are drawn, there is minimal scope for massive physical changes in them. However, the parts themselves can vary (there are several sets in circulation), as can their animation sequences (poses) and colour tinting.

Supporting the systems in this list is Digital DNA—the genetic code that specifies it all. There are 16 gene types in total (Click [here](#) for a full list), divided amongst the above three systems (and the organs containing the biochemistry). In the following few chapters, we go through these in more detail and discuss how they are applied within Creatures to build the Norns, Ettins and Grendels.

The [Genetics Kit](#) allows the Creatures genetic code to be [edited](#), and [new eggs](#) and creatures created.

Users already familiar with the Genetics Kit for Creatures 1 may wish to look at a [summary of the major](#) changes.