The solar-powered SLUG! Creature steals genes from the algae it eats to photosynthesise like a leaf

Biologists found Elysia chlorotica has hijacked a gene from green algae. The slug lives in shallow waters off the east coast of the United States. It uses the gene to maintain chloroplasts it steals from the algae it eats. The slug uses the chloroplasts to create nutrients from the sun's energy. Scientists want to understand how the slug is able to use plant genes. They believe it could help to develop new treatments for genetic diseases.

A bright green sea slug has been found to have stolen genes from the algae it eats so that it can produce energy from sunlight just like plants. The slug, called the eastern emerald elysia or Elysia chlorotica, has incorporated genes from algae into its own chromosomes enabling it to photosynthesis. This process essentially allows the slug to become solar powered, using the sun’s energy to turn carbon dioxide and water into the nutrients it needs to survive.

The eastern emerald elysia (above) has genes from algae within its own genome, making it solar powered. Researchers behind the discovery believe it may be possible to use this form of genetic hijacking between species to create new types of medical treatment for genetic diseases in humans.

Professor Sidney Pierce, a biologist at the University of South Florida and the University of Maryland, said: 'There is no way on earth that genes from an alga should work inside an animal cell, and yet here, they do.

'They allow the animal to rely on sunshine for its nutrition. So if something happens to their food source, they have a way of not starving to death until they find more algae to eat. 'Figuring out the mechanism of this naturally occurring gene transfer could be extremely instructive for future medical applications.'
If it is possible to understand how the slug manages to use these plant genes may allow new types of genes from other species to be used to treat human diseases.

Elysia chlorotica is found in shallow pools and salt marshes along the east coast of the United States, particularly in Massachusetts, Connecticut, New York, New Jersey, Maryland, Florida and Texas.

Juveniles are usually a reddish-brown colour before they begin feeding on algae. It has been known since the 1970s that the Elysia chlorotica is able to incorporate chloroplasts from algae into its own cells, turning them bright green. Chloroplasts are tiny capsules of biological machinery, or organelles, inside green leaves that use sunlight to power chemical reactions that plants need to survive. The slug sucks the sap out of the algae Vaucheria litorea and embeds into the cells of its digestive system. The slug is then able to use these chloroplasts to produce carbohydrates and lipids for itself for up to nine months.

The slug incorporates chloroplasts, shown above in plant cells, into the cells of its own digestive system.

The slug gets its bright green colour from the algae it feeds on (above) as it steals chloroplasts from the plants. Yet how it is able to maintain these chloroplasts for such a long time without the
support provided by a plant cell was not known. Professor Pierce and his colleagues analysed the DNA of the slug and found that it had managed to incorporate a gene from the algae into its own chromosomes. It uses this gene to repair damage to the chloroplasts and to keep it functioning. Professor Pierce said: 'The gene is incorporated into the slug chromosome and transmitted to the next generation of slugs.' 'When a successful transfer of genes between species occurs, evolution can basically happen from one generation to the next.'