Which life forms are most likely to develop on a distant planet?

Recent developments in astronomy have made it possible to detect planets in our own Milky Way and in other galaxies.

This is a major achievement because, in relative terms, planets are very small and do not emit light.

Finding planets is proving hard enough, but finding life on them will prove infinitely more difficult.

The first question to answer is whether a planet can actually support life.

In our own solar system, for example, Venus is far too hot and Mars is far too cold to support life.

Only the Earth provides ideal conditions, and even here it has taken more than four billion years for plant and animal life to evolve.

Whether a planet can support life depends on the size and brightness of its star, that is its 'sun'.

Imagine a star up to twenty times larger, brighter, and hotter than our own sun.

A planet would have to be a very long way from it to be capable of supporting life.

Alternatively, if the star were small, the life-supporting planet would have to have a close orbit around it and also provide the perfect conditions for life forms to develop.

But how would we find such a planet?

At present, there is no telescope in existence that is capable of detecting the presence of life.

The development of such a telescope will be one of the great astronomical projects of the twenty-first century.

It is impossible to look for life on another planet using Earth-based telescopes.

Our own warm atmosphere and the heat generated by the telescope would make it impossible to detect objects as small as planets.

Even a telescope in orbit around the Earth, like the very successful Hubble telescope, would not be suitable because of the dust particles in our solar system.

A telescope would have to be as far away as the planet Jupiter to look for life in outer space, because the dust becomes thinner the further we travel towards the outer edges of our own solar system.

Once we detected a planet, we would have to find a way of blotting out the light from its star, so that we would be able to 'see' the planet properly and analyse its atmosphere.

In the first instance, we would be looking for plant life, rather than 'little green men'.

The life forms most likely to develop on a planet would be bacteria.

It is bacteria that have generated the oxygen we breathe on Earth.

For most of the Earth's history, they have been the only form of life on our planet.

As Earth-dwellers, we always cherish the hope that we will be visited by little green men and that we will be able to communicate with them.

But this hope is always in the realms of science fiction.

If we were able to discover lowly forms of life like bacteria on another planet, it would completely change our view of ourselves.

As Daniel Goldin of NASA observed, finding life elsewhere would change everything.

No human endeavour or thought would be unchanged by it.

Finding life on other planets with Earth-based telescopes is impossible because of the heat of our planet and the dust particles throughout the solar system.

A telescope would need to be as far away as Jupiter.

Even then, the problem will be how to blot out the light from a planet's sun to study it.

The most likely forms of life will be plants and bacteria.

Even the discovery of lowly life forms would change our view of ourselves.

Do you remember ET in the film ET, the Extraterrestrial?

If you do, you will know that the common picture of extraterrestrials is that they will look rather strange-for instance, they might have big eyes and funny feet and be a strange colour-but they will still somehow look like living creatures from Earth.

At the same time, of course, we believe that they will probably have incredible powers-like ET's power to heal injuries and to come alive again.

Many science-fiction stories and films have shown aliens or extraterrestrials like this.

They may somehow look like strange earth creatures, therefore, but they are benevolent.

But what if extraterrestrial beings from other planets are creatures with incredible intelligence and with no form, that is, with no form like earthly creatures?

They might be almost 'living thoughts.' How would we greet them?

How would we deal with them?

And what if they are not benevolent?

In other words, what if they really want to take over the Earth?

There are stories that extraterrestrials or aliens have already crashed on Earth in spacecraft (flying saucers) and that scientists have studied them.

There are even more fantastic stories that scientists are already learning from extraterrestrials' new knowledge, which will help us build incredible spacecraft to fly to other planets and beyond.

Stories like that must surely be just rumours.

Perhaps one day we will know if there really are extraterrestrials out there in space, and if there are, we will know what they look like and what they think of us.

Will they really be little green men?

Or will they be giants?

Or perhaps they will be so small that we can hardly see them?

Will they be friendly?

Or will they want to take over the Earth?

Who knows?

One thing is certain.

If we were ever to discover that there are extraterrestrials out there, the discovery would completely change our view of the universe and ourselves.

Why are planets in other solar systems so much more difficult to detect than stars? Because of the limitations of Earth-based telescopes.

What do we know about the kind of planet, other than our own, that might be able to support life? Its distance from its star will be such that it has a moderate temperature.

A telescope capable of finding life on other planets would have to be far enough from the centre of our solar system not to be affected by dust.

Venus is far too hot and Mars is too cold for there to be any life.

A planet would have to be a very long way from so big a star.

At present, the telescope does not exist that is capable of detecting life.

Nothing in human endeavour or thought would be unchanged.

Imagine a star as much as twenty times larger than our own sun.

The oxygen we breathe on Earth has been produced by bacteria.

As Earth-dwellers, we fondly dream that we will be visited by little green men.

No human endeavour or thought would be unaltered by it.