



# Advice to a young (real) biologist: a ten point program

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Advice to a young biologist who wants to be a real scientist (rather than pursuing a successful career as a paid researcher and administrator) is summarised under ten points: 1. Be an amateur; 2. Read old books and papers; 3. Use your intuition; 4. Follow your nose; 5. Study what really interests you; 6. The timescale of real science is hours/ days or 7-year/ decade units; 7. Apprentice to a master; 8. Publish (only) when you wish to communicate, and (only) what you wish to communicate; 9. Publish (only) for those who are interested, honest and competent; 10. The validity of your work is primarily self-evaluated.

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## 1. Be an amateur

If you want to be a real biologist, then it is extremely unlikely that you will be able to get paid for doing it.

Making a career as a scientist, being paid to do research, is to be dependent on grants and publications for your income – either directly or indirectly. This is a bad idea for a real scientist, a deeply-motivated biologist; because the pressures against honesty and integrity are so powerful as almost to be overwhelming.

Therefore, most real biologists will need to do some other job to earn an income and support themselves.

However, this is not such a bad thing, since all scientists up until the late 1800s did this, including a surprising proportion of the best even during the twentieth century – for example, some biologists were physicians, others were paid to teach science in a college; both doing their science self-funded and during spare time.

## 2. Read old books and papers

Due to the corruption of science in general and biomedicine in particular, most published science for the past generation is dishonest. Furthermore, due to the massive expansion of personnel and ever-narrower micro-specialisation, most recent science is incompetent and ill-informed.

The situation is that nearly-all modern published research is false or misleading. And this is a serious problem for the young and learning real biologist.

Therefore, it is best to use old publications – from the times when most biologists were honest, able and well-educated - as much as possible, in order to learn what you need.

As an approximation, almost all published work before 1945 can be relied upon as honest and competent, most of it up to 1965 – and even into the 1980s a reasonable proportion of published research was reliable.

But it is best to use old sources for facts, and almost essential to do so for theories. When you are grounded in the old, honest and reliable; you may then move-forward cautiously – sifting the grains of scientific wheat from the mass of misleading chaff.

### **3. Apprentice to a master**

The best, or at least most efficient, way to learn how to be a real biologist is by becoming an apprentice to a master biologist, someone who already understands it and can already do it.

But finding such a person is usually difficult, sometimes impossible. And even if a master is found, he may decline to mentor you.

You will need to avoid eminent, powerful and successful professional research 'scientists'; because nowadays these are usually corrupt (even if they had been real scientists when younger): most are dishonest and/or incompetent. Their motivation is pursuing a career or building an 'empire'; they are not even trying to do the best scientific work of which they are capable.

In practice, you will often need to become a 'virtual' apprentice to one or more biologists of the past, through close, patient and loving immersion in their written work.

### **4. Use your intuition**

If you want to do real biology you will need to use your intuition, and to train that intuition on biology in general and the specific area of biology that particularly interests you. You need to develop a 'feel' for the subject, its nature, how things work in biology etc.

The ideal is to be 'apprenticed' to an older and already experienced real biologist – but these are hard to find, and may not be cooperative. Reading old biological books is another good way of 'tuning' your intuitive instincts to the subject.

Patient, prolonged, care-full, loving immersion in the practicalities of biology – especially detailed observation – is probably the very best way to get an intuitive feel for the subject.

Intuition is the primary source of real science – logic, observation and experiment are vital but secondary.

### **5. Follow your nose**

When it comes to reading and thinking, you should follow your nose – be guided by intuition and instinct. Trust in destiny! When your mind is working on a problem over the long-haul, subliminal forces will be operating. Anything may turn-out to be just exactly what you later need, vital to success; even if it is not biology, even if it is not science.

### **6. Study what really interests you**

You will never be much good as a scientist unless your motivation is strong, true and (to a large extent) spontaneous.

You need-to want-to get up early or stay up late (or both!) to work on your chosen topic!

Francis Crick suggested that you might research whatever it is that you gossip about for fun – whatever you spontaneously pull a conversation around to; Jim Watson made the complementary suggestion that you avoid any subjects (or people) that bore you – that fails to excite you.

The reason is that to do good science usually takes considerable perseverance over a considerable time; and you will not be able to force yourself to do this – it needs to come naturally and from within, or else it won't happen.

### **7. The timescale of real science is hours/ days or 7-year/ decade units**

Modern professional research (i.e. not real science) is a medium-term affair: dull in the short term, yet without any genuine long-term.

This is a consequence of, on the one hand, the modern need for everything to be grant-funded hence pre-planned in detail without scope for spontaneity, but instead requiring plodding diligence; and on the other hand professional research being tightly-constrained by external and managerial timescales for evaluation – such that three or at most five years is regarded as the maximum time-horizon (indeed measurable ‘outputs’ are expected at a rate of several per year).

But real science is exciting on a short-term basis – with the possibility of following-up new ideas or evidence immediately – within hours or days; and potentially making a breakthrough. Yet, as I indicated above, it may take many years (for whatever reason, seven years is often approximately the length of time; but it could be a decade, or even more) to solve a really difficult scientific problem – during which time there may be little to show for the effort.

### **8. Publish (only) when you wish to communicate, and (only) what you wish to communicate**

‘Nuff said.

### **9. Publish (only) for those who are interested, honest and competent**

Access to prestigious conferences, journals and publishers is usually (for one reason or another) blocked for the real scientist – such outlets being reserved for the peer reviewing cartel of senior administrative researchers.

This means that letters, e-mails, web publications, open journals (like The Winnower), talks to small groups, self-published work lodged in libraries... suchlike modest and self-controlled publications will suffice as ‘outputs’ so long as they are brought to the attention of that handful of people who need to know, and ought to know, about the work. (A real scientist will be unconcerned by the place, method or mode of publication.)

And that is about as much as can, or should, be done in ‘disseminating’ (certainly not ‘promoting’!) one’s own work.

The history of science reveals (on the whole) that valid work will find its own level when science as a social system is functioning properly. (And when it is not, there is nothing you personally can do about it – except to stay truth-full and avoid compromising with corruption.) You must have faith that good work will sooner or later ‘find a way’.

Of course, in the end your name as author may have become detached from the work – like the inventors of the architectural arch, the stirrup or plough – but that can happen anyway (credit is often stolen or misapplied). Ideally, a real scientist ought not to concern himself with such matters; and anyway the work of discovering the truth about reality using the approach of real science brings its own intense and lasting personal satisfaction.

### **10. The validity of your work is primarily self-evaluated**

Intuition is not only the primary source of real science, it is also the primary criterion of its validity.

Properly understood, intuition is the mobilisation of a scientist’s full personal resources – his intelligence, memory, skill and also his feelings and emotions; both external evidence and internal introspection – all brought-to-bear on the problem at hand.

‘Evidence’ is never conclusive, and the evaluation of other people is only of value when they are honest, competent, informed and have thoroughly engaged with your work – a combination which may never occur in practice.

So, in the end and over the long-run – the good scientist is usually his own most incisive critic; and as a real biologist your current creative practice will often be trying to anticipate and satisfy the criticisms of your later self.

**Further reading**

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