Abstract—A central theme in learning from image data is to develop appropriate representations for the specific task at hand. Traditional methods use handcrafted features that are highly problem-dependent. Thus, a practical challenge is to determine what features are appropriate for specific tasks. To address this fundamental challenge, we have been developing deep learning models for learning from various biological image data, such as the in situ hybridization gene expression image data and the brain electron microscopy imaging data. Such models operate on the raw input images directly and consist of many layers of feature extractors that are fully trainable. To enable parameter estimation on a small number of labeled examples, we developed transfer learning and multi-task learning methods for deep models. I will demonstrate how these techniques together can be used to solve a variety of bioimage informatics tasks, such as image recognition, segmentation, and completion.